AIR FORCE

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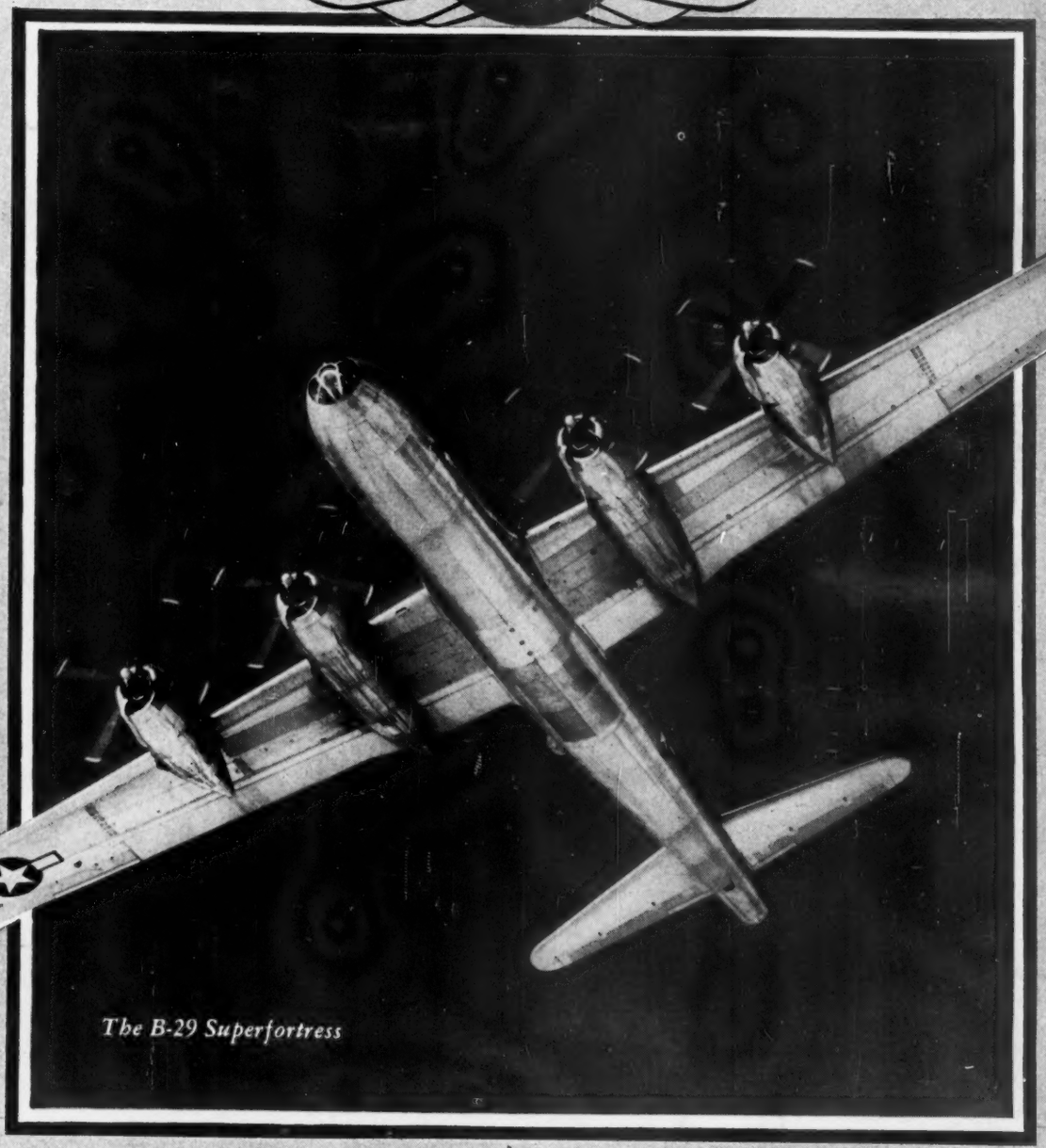
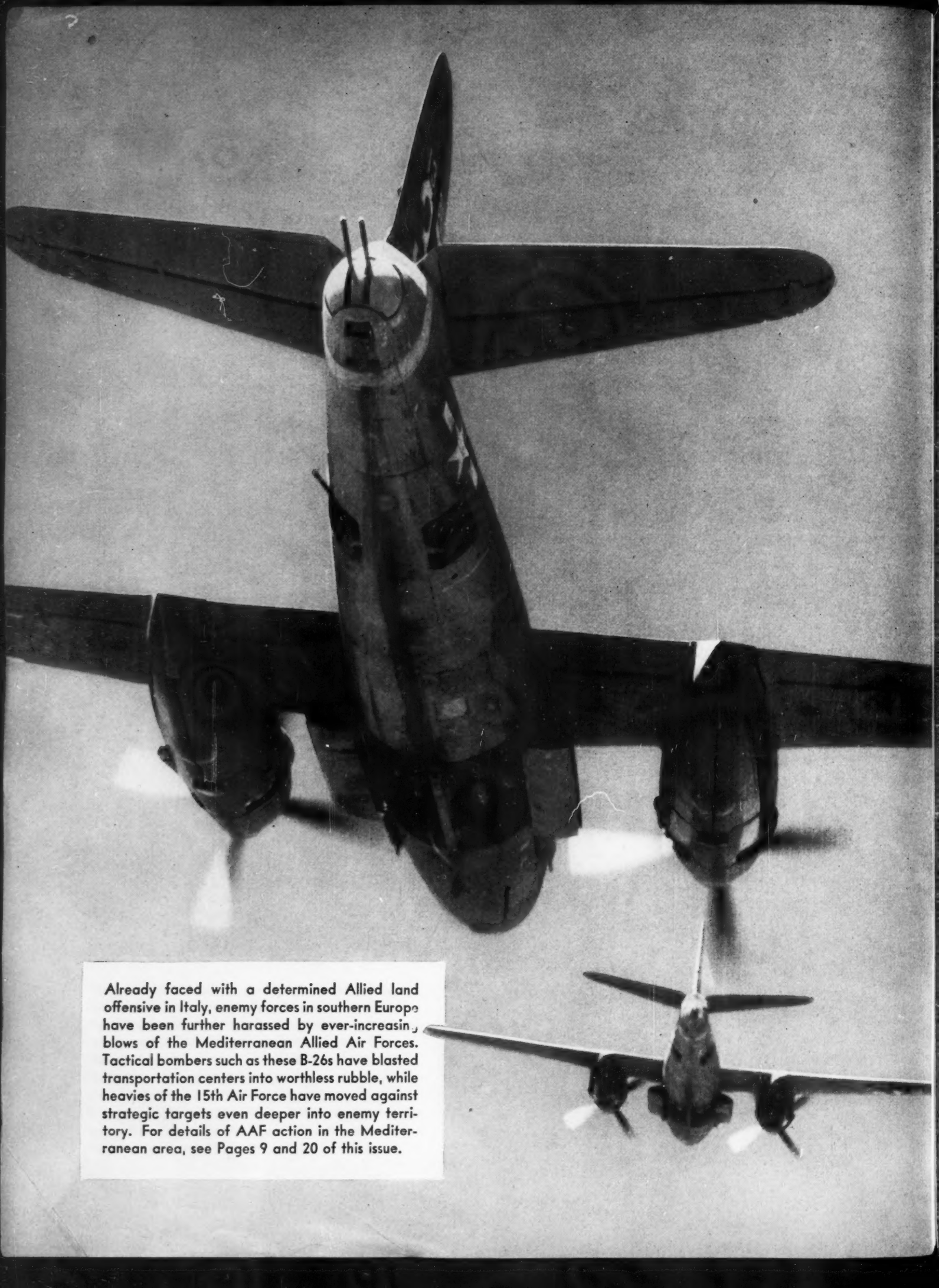


The B-29 Superfortress

JULY 1944



Already faced with a determined Allied land offensive in Italy, enemy forces in southern Europe have been further harassed by ever-increasing blows of the Mediterranean Allied Air Forces. Tactical bombers such as these B-26s have blasted transportation centers into worthless rubble, while heavies of the 15th Air Force have moved against strategic targets even deeper into enemy territory. For details of AAF action in the Mediterranean area, see Pages 9 and 20 of this issue.

AIR POWER IN THE INVASION

'If you see a plane it will be ours.' It was up to 31,000 airmen to make good that promise on D-day. They did.

By Cable from AIR FORCE Staff Correspondents in the ETO

INSIDE the metal skins of hundreds of C-47s, soot-faced paratroopers knelt in final prayer. Standing beside their fragile craft, glider pilots checked their watches as the minutes ticked away toward midnight. On the Channel coast, civilians felt their beds rock and houses shudder as the RAF hurled down on ten Nazi gun emplacements the heaviest night bomb load of the war. All day long, Lightnings had patrolled the Straits, guarding ship movements from hostile eyes. Now the great armada was well under way, a thousand phosphorescent wakes gleaming under clouded skies. At bomber and fighter stations all over England, lights burned behind guarded doors as the last secret orders came in. Weeks of tension were building to a final climax. This was it; this was D-day.

Shortly before midnight, three airborne divisions were on their way—the American 82nd and 101st and the British 6th. At six minutes past midnight, one great sky serpent, nine planes wide and 200 miles long, thrust its head across the enemy-held coast. Ten minutes later the lead plane of the 9th Troop Carrier Command's Pathfinder group was over the designated drop zone. Lights by the open door of the Skytrain winked red and then green. Carrying radio equipment that would greatly facilitate navigation for succeeding aircraft, the first stick of paratroopers tumbled into the flak-streaked darkness. The time was 0016 June 6, 1944. The liberation of Europe from the west had begun.

Almost unchallenged the great procession swung back toward its base. As the head recrossed the English coast, the tail was still going out, roaring across the choppy Channel at 300 feet. As each section of the body passed over Cherbourg Peninsula at a slightly increased altitude, hundreds of parachutes blossomed in the gusty air. Some came down through clouds that hung as low as 500 feet. As fast as they hit the ground, the paratroopers seized key positions and began clearing the landing areas of obstructions left by the Germans. Gliders came spiraling down—British Hamilcars and Horsas and the smaller American CG-4As—carrying fighting troops, ammunition, land mines, field artillery, jeeps, medical supplies and even complete radio stations in some cases. The heavy Horsas actually mowed down German obstacles. The giant Hamilcars, with greater wingspread than a Lancaster, disgorged tanks. Some cracked up but still delivered cargoes. Later the Germans complained bitterly about the Allied use of dummy paratroops. One American glider landed by mistake on a roof, spilling out a combat team who promptly captured the village. Others were briefed to land directly on top of gun positions, silence the gun crews and get away before the Allied bombers returned to the job. They did.

THE losses among the Skytrains, flying unarmed and unescorted at less than 1,000 feet, were astonishingly light. The Americans lost only 26 aircraft out of almost 1,000 dispatched, a bargain price to pay for the achievement of landing two crack divisions behind the Atlantic Wall. All the lessons learned in the dangerous night exercises during the past weeks in Britain were brilliantly applied. The 9th Air Force's Troop Carrier Command could well be proud of the night's work.

By the time the Skytrains were back at base, preparing to fly reinforcements to the men they had dropped, the daylight forces were being briefed for the greatest air effort in history. Everything was going to be thrown in, from heavies to fighters. "You needn't worry about the air," the Supreme Commander had said to his assault troops a few hours before. "If you see a plane it will be ours." It was up to the airmen to make good that promise. Before 0800 hours on D-day, 31,000 of them had helped make it a reality.

Actually, General Eisenhower's prediction, the highest possible tribute to Allied air power, had been made possible by months of unending work on the ground and unceasing heroism in the air. Factory workers in America and Britain were partly responsible, so were American aircrews who flew from Italy to blast German fighter factories in Austria. Ground crews in Britain, working eighteen hours or more each day to keep the planes in the air, shared credit equally with the men who scored the air victories. It was the sum total of the effort that counted.

It would be absurd at this stage of the game to attempt to evaluate air power's contribution to the initial success of the invasion. But looking back over the months that preceded D-day, a certain orderly and logical sequence of achievements can be discerned. First of all, the Luftwaffe was forced back into Germany. This was primarily the contribution of the heavy bombers of the 8th Air Force and the fighter escorts who dealt such terrible

blows to the war-making capacity of the Reich and to the Reich itself that Hitler was forced to husband his dwindling air strength to protect the Homeland. Medium bombers and fighters of the 9th Air Force and the RAF's 2nd Tactical Air Force also deserved credit for making the coastal airdromes too hot for the Luftwaffe to use with any comfort. But it was primarily strategic pressure on Das Vaterland and the steadily dwindling aircraft reserves that cost Jerry all hope of contesting the air over the beaches as he had done at Dieppe.

Once this forced withdrawal of the enemy air force was accomplished, Allied airmen were able to turn their attention to the network of communications on which the Germans relied to supply the armies of the Atlantic Wall. Heavies, mediums, light bombers and fighters of both the RAF and AAF, hammered marshalling yards, junctions, tunnels and bridges into a state of chaos. By D-day, out of twenty-four railway bridges and fourteen road bridges across the Seine between Paris and the sea, all but one railroad bridge and five highway bridges were knocked out. By D-day plus one, they were all destroyed. The effect on Rommel's ability to shift troops quickly can easily be imagined. And the onslaught against rolling stock and road traffic never ceased.

THE pre-invasion function of air power was to observe as much as possible of enemy preparations while denying him the benefits of photo-reconnaissance. In endless sorties, Allied photo planes obtained coverage of the entire enemy-held coastline. At low tide they photographed the steel obstructions planted by the Germans to repel landing craft. Inland they kept a watchful photographic eye on the progress of the anti-glider and anti-paratroop installations. Our fighter sweeps were unable completely to prevent German photo-reconnaissance, especially at night, but restricted it to a point where the Germans obviously were kept guessing.

The fourth and perhaps supreme tactical contribution of Allied air power was the blitz on German coastal defenses themselves for weeks before D-day. Bombers poured an endless stream of high explosives on naval guns—155mm and 170mm—housed in steel and concrete emplacements. On the night before D-day, the RAF dropped 5,000 tons on ten of these crucial batteries in the area between Le Havre and Cherbourg—more tonnage per battery than London ever received at one time during the height of the blitz. At dawn 1,300 American heavies took over where the RAF left off. As a result, the gunfire greeting the seaborne forces was much weaker than expected. The great guns on our battleships could and did silence the shore guns still able to fire, but the fact that early reports indicated only two destroyers and one LST sunk out of an armada of 4,000 ships shows how thoroughly the way had been prepared.

To thousands of American airmen in Britain, the first warning that H-hour was at hand came when iron security regulations were clamped down on stations, guards were doubled, briefing room doors were locked and no one was allowed to leave. Post visitors were not told of the alert until after they were admitted and then found that they could not leave. In some cases, this sequestration led to awkward situations. At one fighter station, presumably unadorned by any Wacs, the harassed supply officer was pestered by indignant female hostages to provide certain items which he never before in all his Army career had been called upon to produce. At another base, the local vicar arrived in high dudgeon to demand the release of several young women of his parish who, he said, were not adequately chaperoned. They were not released. A farmer, finding the village veterinarian was among those interned, wistfully drove a sick cow up to the gate. The sentry informed him that the cow could be treated only inside the fence and that it would have to stay there. At another station two innocent passersby, who displayed mild curiosity at the blue and white zebra stripes with which all invasion aircraft were ferverishly being painted, were enticed inside and held.

Probably the first four-engine American aircraft to participate in the invasion plan were six Fortresses that dropped leaflets warning the French of the storm about to break. Long before any daylight, hundreds of heavies and mediums were airborne, some taking off by moonlight. D-day had been postponed 24 hours to let the weather improve but it was still far from perfect. Through breaks in the clouds, crews of the heavies caught glimpses of the sea armada far below. Some claimed that their bombers were rocked even at that altitude by the concussion of naval broadsides being fired across the beaches.

MARAUDERS, flying lower than on any occasion since their disastrous debut in the ETO, had a better view than anybody. They saw tanks crawling ashore to engage the enemy, fields filled with the wreckage of gliders, bomb-pocked ground littered with parachutes. Fighters, never less than 200 feet over the beachheads, prowled restlessly up and down looking for the Luftwaffe. On the whole they were disappointed. Goering had issued a statement to the effect that the invasion had to be repulsed even if the Luftwaffe perished in the effort, but apparently the Luftwaffe was not ready for a showdown. Barely fifty enemy planes were seen in the battle area all day. Four of the twelve JU-88s that made a pass at one of the beachheads were destroyed. With approximately 10,000 Allied sorties being flown, the odds against the Luftwaffe were 200 to 1. The Supreme Commander was right: the assault troops did not have to worry about the air.

All through D-day endless air processions went on. The 8th Air Force flew over 4,300 sorties; this was as many battle flights in one day as the 8th Air Force had completed in its first seven months of operations over Europe. The 9th chalked up better than 4,800 and the RAF's 2nd Tactical Air Force recorded some 2,000. It is probable that in the first 24 hours more than 13,000 battle flights were flown. When the late summer darkness descended, the Allied night fighters took up patrols and shot down twelve enemy aircraft that attempted to attack the beaches.

Air opposition stiffened slightly the next day. Air losses were even—both sides losing 23. For the Allies, however, this represented only a tiny fraction of the total forces engaged. By noon of D-day plus two, only 289 aircraft were missing of some 27,000 sorties flown—an overall loss ratio of barely one percent. Meanwhile, the Luftwaffe lost 176.

THE close support afforded by the tactical air forces during the first three days was magnificent. The Marauders, sometimes flying three missions a day at whatever altitude the weather permitted, added their bombweight to the naval bombardment of the stubborn German stronghold of Caen. Bomb-carrying P-47s pinpointed the troublesome gun positions and silenced them. Four 9th Air Force groups were singled out for special commendation by a spokesman representing General Montgomery. Meanwhile, 1,000 American heavies blasted airfields in a wide arc around the battle zone. General Eisenhower referred to "the long and brilliant campaign conducted in the past months by the combined air forces." It had been, he said, an essential preliminary to invasion and he congratulated the airmen on keeping up the good work. Other Allied leaders agreed that the air support was all that could be desired.

On Friday, June 9, the uncertain weather became so bad that all Allied air activity ceased. This respite gave the Germans a chance to bring up badly needed supplies and hindered the landing of our own. The communications of both sides, to a large extent, were at the mercy of the weather, but what was favorable to one handicapped the other. Bad weather tended to bottleneck Allied supplies on the beaches. Good weather closed the stranglehold of Allied air superiority around Rommel's throat.

On Saturday, when the skies cleared somewhat, our planes found the roads behind the enemy lines choked with rein-

forcements. They took up strafing where they had left off on Thursday. Marauders flew in as low as 200 feet. One came back with a fragment of its own bombs lodged in the wing. Twenty-eight enemy aircraft were destroyed that day; twenty-six of ours were lost. Sunday was the same story except that our losses were even lighter and the Luftwaffe more elusive than ever.

By Saturday, emergency landing strips were being used by Allied planes running short of fuel or suffering battle damage. Sites for these landing strips were chosen before the invasion troops left England. Engineers had landed on D-day and bulldozers followed that night. The first strip had been carved out of a corn field under sniper fire and was ready for action by Friday afternoon.

By Monday a Spitfire wing was in full operation and air evacuation of the wounded by transport plane had begun. With the Troop Carrier Command's great fleet of Skytrains virtually intact, supply by air may assume great importance as airdromes are captured farther inland.

As these words are written, on the morning of June 12, D-day plus six, the German Air Force has yet to put in an appearance. Rommel seems to be committing his reserves piecemeal but they are battling without benefit of air power. Germany certainly has enough front line air strength left to make a fight of it for a limited time at least, but so far she is

For Contents and Cross Country, See Page 8.

either unable or unwilling to do so. Probably both. Airfields near the battle zone are likely to prove death traps for grounded aircraft. Besides, if the Luftwaffe moves its limited fighter strength forward, American heavies will smash targets left unprotected in the Reich. Already since D-day, Italian-based Fortresses and Liberators in great strength have attacked factories in Austria. The Nazis are in the unhappy position of a boxer with only one hand to guard himself. If he tries to protect his face, he risks a knockout blow in the solar plexus.

Rommel may be saving his air strength for all-out counterattack. If so, British and American fighters are more than ready for him. With Rome fallen to the Allies, with shuttle bombing to Russia from Italian bases an established fact, with the Soviet steam roller beginning to move into Finland, with the last Rumanian oil refineries smashed, the Nazi's plight is an unenviable one.

As one of their own newspapers put it, the success of the Allied invasion "would simply mean the end."

With that Teutonic wail of defeatism, no one seemed likely to disagree. ☆

20th Air Force Superfortresses Open New Era of Aerial Warfare

THE bombing of Japan by B-29 Superfortresses has marked a major development in aerial warfare which is destined to play a leading role in crushing our enemy in the Far East.

Word of the June 15 attack on the heart of the Japanese empire was accompanied by the official announcement that a new air force—the 20th—had been created to have jurisdiction over all combat operations of the B-29.

The 20th Air Force is operated directly under control of the Joint Chiefs of Staff and is commanded personally by General H. H. Arnold, Commanding General of the AAF, with Brig. Gen. Haywood S. Hansell, Jr., as Chief of Staff.

Soundness of such an operational plan was explained by General George C. Marshall, U. S. Army Chief of Staff, who declared the long-range bomber introduced a "new type of offensive against our enemy" and created "a new problem in the application of military force."

"Because of the enormous range and heavy bomb loads of these Superfortresses," said General Marshall, "... they can strike from many and remote bases at a single objective. The power of these new bombers is so great that the Joint Chiefs of Staff felt that it would be uneconomical to confine the Superfortress organization to a single theatre. These bombers, therefore, will remain under the centralized control of the Joint Chiefs of Staff with a single commander, General Arnold, acting as their agent in directing their bombing operations throughout the world. The planes will be treated as major task forces in the same manner as naval task forces are directed against specific objectives."

General Arnold paid tribute to our planners and engineers, coupled with the capacity of American industry, as "an unbeatable combination" and stated that the advent of the B-29 makes possible the softening-up attack on Japan very much earlier than would be possible with aircraft hitherto known to combat.

"The Superfortress," he said, "is not going to win the war by itself nor has anyone thought that it will do so. It will, however, like its predecessors, the B-17 and B-24, strike at the sources of enemy strength and prepare the way for ultimate decision by our well established team of land, sea and air forces.

"In our new strategic thinking, the B-17 and B-24 will now become medium instead of long-range bombers and our B-25 and B-26 aircraft will become short-range bombers. These smaller planes will travel no less distance than they do now, but the B-29 will attack from much greater distance and with much more power.

"The employment of the B-29 is just beginning. It goes directly into battle from the production lines and we have a lot to learn before its full power may be developed. Consequently, the frequency of its use will be carefully determined for some time. From this circumstance, let our enemies take what comfort they can—while they can."

The production story of the B-29 appears on Page 4.

THE B-29 SUPERFORTRESS

By Col. Donald L. Putt

CHIEF, BOMBARDMENT BRANCH, ENGINEERING DIVISION, MATERIEL COMMAND

THE XB-29 was flown for the first time in September, 1942. Ten months later, in July, 1943, the first production model of the B-29 was completed.

First of the new series of very heavy bombers, the B-29 is far more than a grown-up B-17; its name of Superfortress belies the extent of revolutionary design and structural changes incorporated in our newest and biggest tactical bomber. Actually, the B-29 is as different from the B-17 as the Thunderbolt is from the original Seversky P-35 pursuit.

Outstanding features of the B-29 are: a new type Boeing wing that is claimed to be the most efficient ever designed; a new flap design that limits take-off and landing runs to those of B-24s and B-17s by increasing total wing area nineteen percent when extended; a dual wheel fully-retractable tricycle landing gear; direct actuating controls without booster systems that handle easier than a B-17's; 2,200 hp, 18-cylinder Wright Cyclone engines with dual sets of turbo-superchargers; four-bladed propellers so large (16 feet, 6 inches) they must be slowed down by 35/100th reduction gears to keep the tip speed under the speed of sound.

Statistically, the plane is a third again the size of the B-17, with a speed over 300 mph, an altitude of over 30,000 feet, very long range and a very heavy bomb load. Its wing span is 141.3 feet, its length, 99 feet and its height, 27.9 feet.

As it will write a new chapter in the AAF's concept of aerial warfare, another chapter—this one historical—can be revealed concerning the original conception and design development of this new substratosphere bomber.

During the middle 1930s, aircraft manufacturers were being coaxed along to build bigger bombers with higher altitude performance. The B-17 was the first, in 1935. Next came the XB-15, half again the size of the Fortress, but it was too slow; the XB-19, twice the size of the Fortress, was not sufficiently maneuverable, was limited in performance by undersized engines.

STILL, we needed a newer and bigger bomber. In early 1939, AAF tactical staffs under General H. H. Arnold and Materiel Command engineers under Maj. Gen. Oliver P. Echols, prescribed the military requirements around which our next bomber was to be built. They were assured by aircraft engine makers that horsepower in excess of 2,000 could be expected by the time the plane was to be flown.

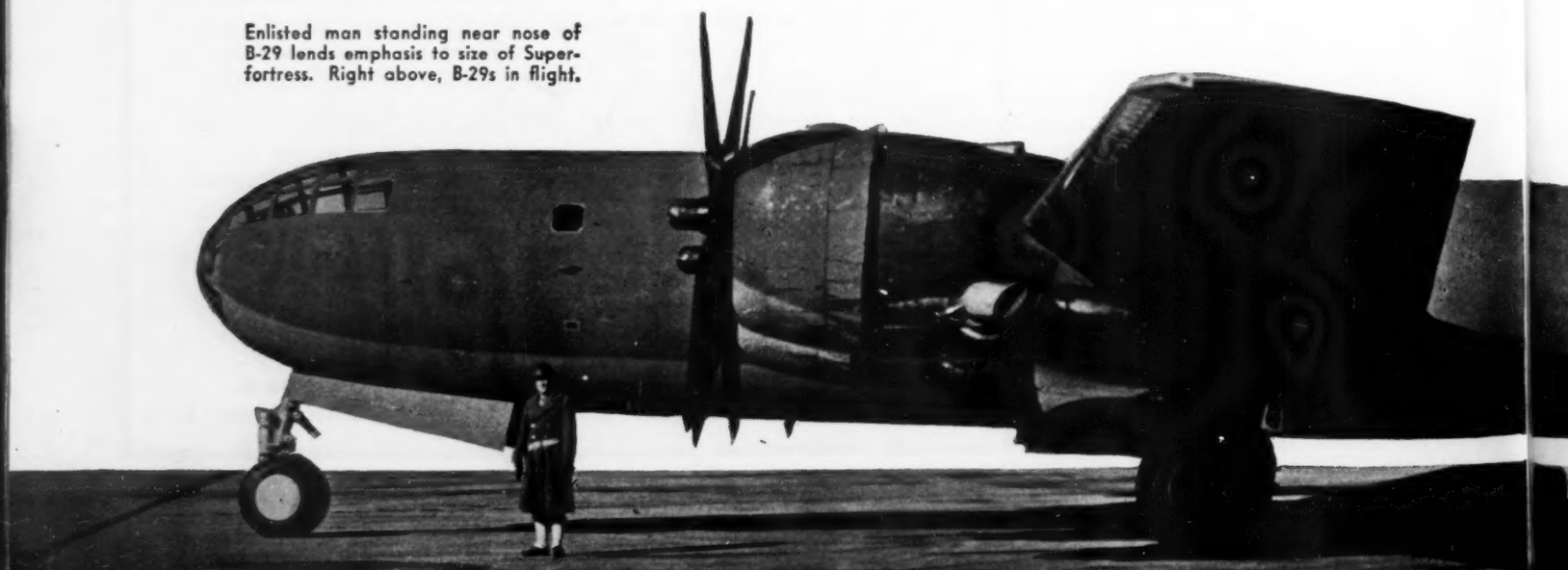
Next step—this was peacetime—was to circularize aircraft manufacturers for designs built around the military specifications. Then, as sketches and proposals began to flow into the Materiel Command at Wright Field, the Germans launched their war in Europe. From reports and observations of German progress in aerial warfare, our tactical staff revised its specifications to include leakproof fuel tanks, multiple gun turrets, heavier caliber guns and cannon—and more of them—more range and altitude.

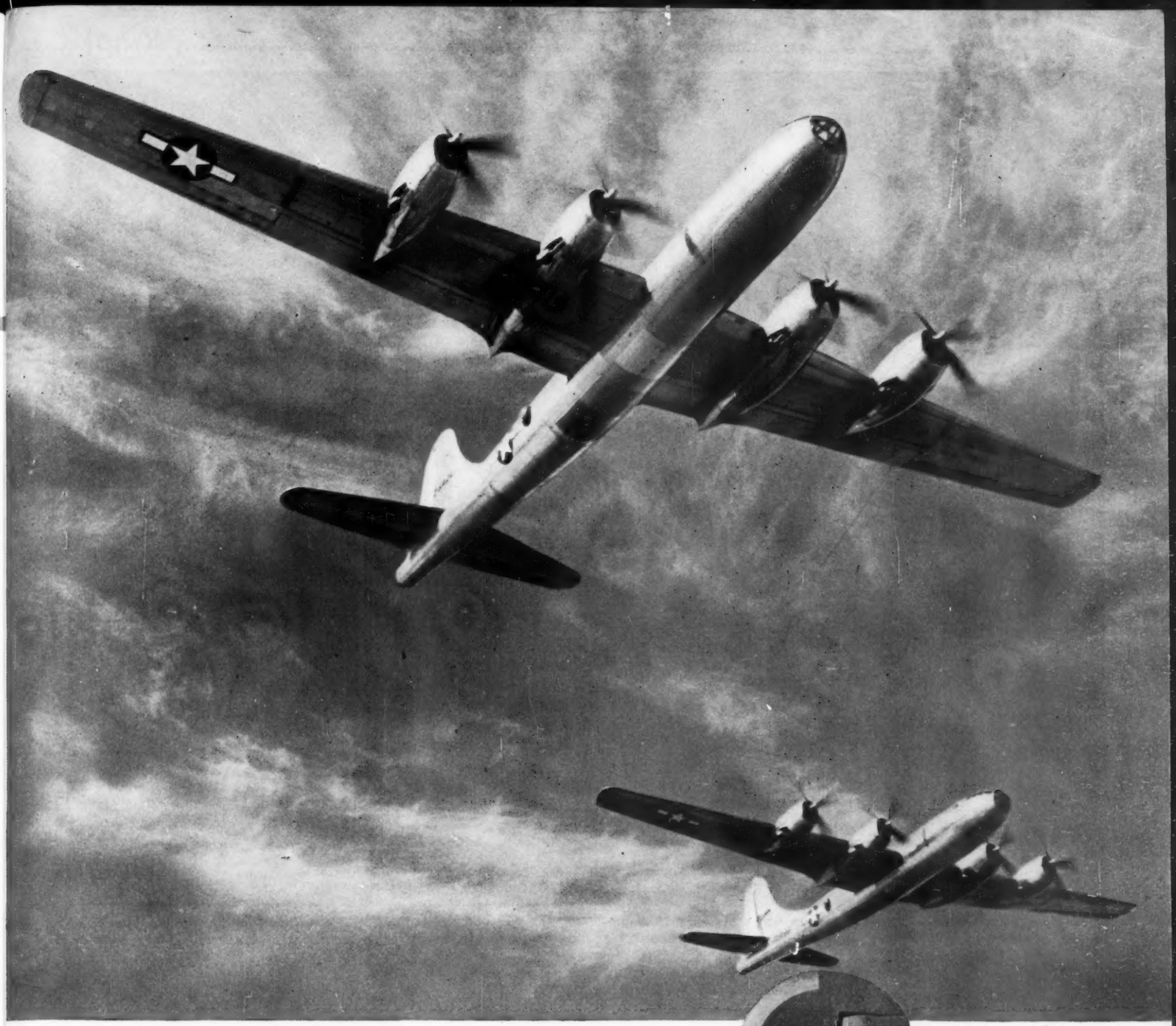
All sketches submitted by aircraft manufacturers were rejected temporarily, pending the incorporation of these changes dictated by military necessity. Two companies (Boeing and Lockheed) were awarded contracts for an experimental plane when the plans were resubmitted. Lockheed, which already had the Constellation "in the works," intended to revamp it into a bomber. The sudden need for thousands of P-38s, however, forced Lockheed to drop its big bomber project.

Boeing, with its Stratoliner and experience with the B-17, remained as the manufacturer charged to build the first of the extra-heavy bombers, the XB-29, now known as the Superfortress.

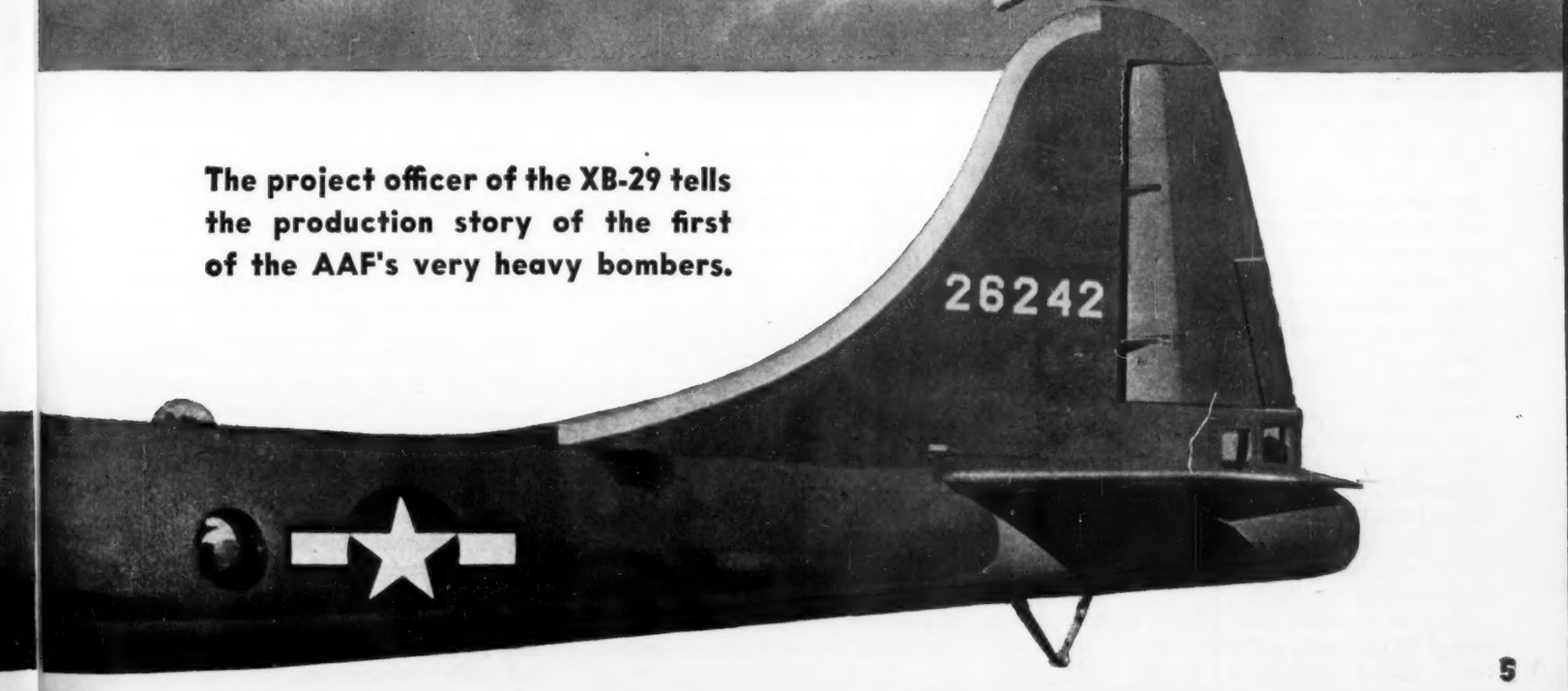
Between the time the XB-29 design

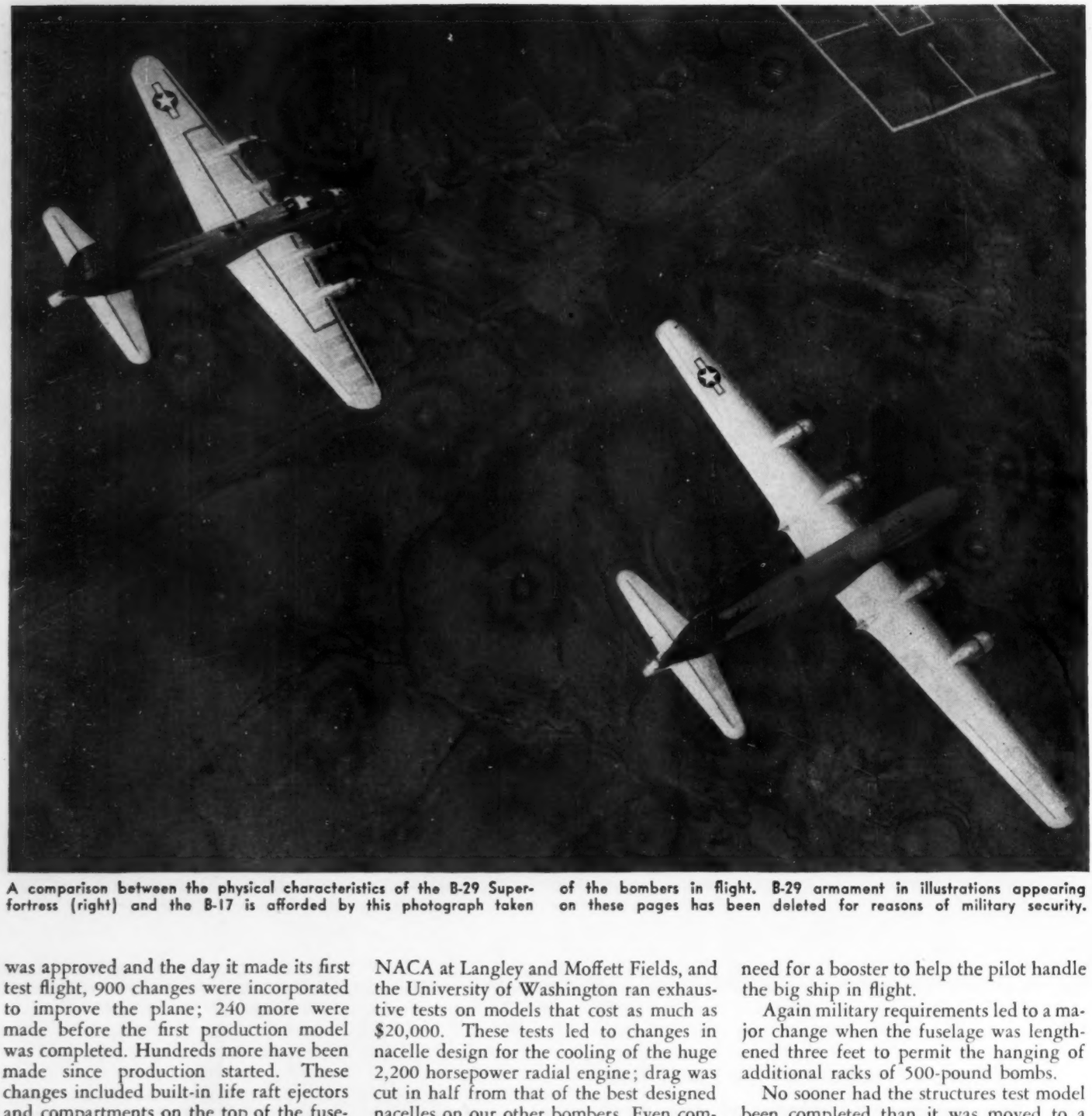
Enlisted man standing near nose of B-29 lends emphasis to size of Superfortress. Right above, B-29s in flight.





The project officer of the XB-29 tells the production story of the first of the AAF's very heavy bombers.





A comparison between the physical characteristics of the B-29 Superfortress (right) and the B-17 is afforded by this photograph taken of the bombers in flight. B-29 armament in illustrations appearing on these pages has been deleted for reasons of military security.

was approved and the day it made its first test flight, 900 changes were incorporated to improve the plane; 240 more were made before the first production model was completed. Hundreds more have been made since production started. These changes included built-in life raft ejectors and compartments on the top of the fuselage, a switch from blunt to rounded wing tips, lengthening of the tail to provide for better nacelle contour, improved soundproofing of the cabin, and even the relocation of the crew's lavatory from the right side of the fuselage to the left for reasons of weight.

Inspection of the full-size, all-wood mock-up was made by AAF engineers in November, 1940. Two months later, the XB-29 was under construction in the jigs; four planes were being built simultaneously—one for structures testing, three for flight testing.

Cost of the first four planes approximated $6,500,000, including models and tests. Wind tunnels at Wright Field, NACA at Langley and Moffett Fields, and the University of Washington ran exhaustive tests on models that cost as much as $20,000. These tests led to changes in nacelle design for the cooling of the huge 2,200 horsepower radial engine; drag was cut in half from that of the best designed nacelles on our other bombers. Even compressibility problems were tackled.

Drag was reduced to a minimum by flush-rivet and butt-joint construction. The plane was "clean" aerodynamically, so "clean" that the landing gear, when extended, comprises fifty percent of the drag.

Further wind tunnel tests proved that counter-rotating propellers on each side would improve further the aerodynamics of the plane by nullifying torque. However, with an eye to maintenance problems, it was decided to have all propellers turning in the same direction. This decision led to further research and development of a new rudder design to solve the torque problem. A rudder balance contour also was perfected which eliminated the need for a booster to help the pilot handle the big ship in flight.

Again military requirements led to a major change when the fuselage was lengthened three feet to permit the hanging of additional racks of 500-pound bombs.

No sooner had the structures test model been completed than it was moved to a specially-constructed T-shaped test building where engineers proceeded to destroy the plane—piece by piece to determine its ultimate strength and load capacity.

Finally, on September 14, 1942, the first XB-29 taxied out on the runway for the initial flight. Eddie Allen, Boeing's chief test pilot, was the man at the controls. The huge sky battleship took off, circled Seattle for about an hour and landed with the ease of an airliner.

Allen, who seldom voiced an opinion about any plane (and he had flown hundreds) simply grunted, "She flies."

George Schairer, one of Boeing's crack aerodynamicists put it another way: "It's the first ship which, after the first flight,

permits me to go home and have damn little to do."

The next day, after a final check-out, I made a second flight in our new XB-29. After a short hop, I jotted down some notes: unbelievable for such large plane to be so easy on controls . . . easier to fly than B-17 . . . faster than any previous heavy bomber . . . control forces very light . . . stall characteristics remarkable for heavy plane. . . .

In rapid succession, for weeks and months, we ran series of carefully planned tests for high speed, landings and take-offs, fuel consumption, speed calibrations, weight trials and firing practice.

Allen and I were at the controls the first time we took the plane off with a full load. It was to have been a normal take-off, but we inadvertently failed to lower the flaps. Nevertheless, the heavily loaded plane lifted off the ground about two-thirds of the distance down the runway, further proving our faith in the plane's flying qualities.

USUAL "teething" troubles of any new plane were ferreted out and remedied during the flight and ground tests—fuel gauges, ignition systems, auxiliary motor-generators, bombing equipment, fuel cell leakage, control cable systems. Each change carried the plane closer to combat. When all of the major "bugs" had been worked out, the B-29 was booked for its big show.

On February 18, 1943, tragedy struck. Eddie Allen, with a fine crew, was killed in the crash of the No. 2 airplane, which had been completed to help with the flight test routine. While in sight of the field, fire broke out in the plane's engines. Allen attempted to get the big ship back but, when just a mile short, the plane fell out of control and dived into a Seattle meat packing house.

Naturally, the crash retarded the program. Causes were indefinite according to the investigation report of the crash board. Steps immediately were taken to reduce all fire hazards in the airplane and, until these changes were made, flight operations were suspended. It was not until September, 1943, that the first ship again took to the air to resume tests.

Meanwhile, production models were being fabricated. We were certain enough of the airplane by now to go ahead full-speed on mass production. To carry out the tremendous program, new plants were constructed and tooled up in Wichita, Kan.; Renton and Seattle, Wash.; Marietta, Ga.; Cleveland, Ohio, and Omaha, Neb. Four different manufacturers tackled the program and 41 percent of their work was subcontracted to other business establishments throughout the United States. When the first production model B-29 came off the assembly line in July, 1943, it already was a modified airplane from the XB model, main difference being in armament which had been increased as combat dictated the need for more firepower.

Minor alterations constantly are being incorporated as we gain more flight experience; from combat experience, additional modifications will be suggested to increase the effectiveness of this Superfortress against enemy opposition and over enemy targets.

Outstanding aerodynamic development in the B-29 is the low-drag Boeing 117 wing. It carries a high wing loading that is compromised during landings and take-offs by a huge Fowler-type flap adapted to the wing. The new wing has more gradual stalling characteristics and better stall warning than other types used on bombers. The drag per pound of lift has been greatly decreased.

Stability of the plane is excellent; any tendency to fall off on one wing during a stall carries through into a bank and then into a straight-away glide.

Advantages of the tricycle gear—first on a Boeing plane—are easier loading of bombs because the bomb bay is closer to the ground and increased safety in landings, particularly in a cross-wind. Tires are the same size as those used on B-24s and B-17s. The gear retracts electrically. Brakes are operated by a hydraulic boost—the only hydraulic device on the plane.

Belly landings have been made by several of the Superfortresses and in no case did such a landing cause any extensive damage to the plane Both ships stopped with hardly a jolt to their crews.

The bomber's structural members are thicker than any used in previous bomber construction. Some of the highly stressed members are of a web-type construction resembling the truss-work of a bridge or a ship's bulkhead.

Eleven and half miles of wiring wind through its framework. There are 150 electric motors of 49 different types.

The interior of the B-29 is almost as large as that of the Stratoliner. The crew is composed of eleven men—pilot, co-pilot, bombardier, engineer, navigator, radio operator and gunners. For comfort, there is a small washroom and four bunks, with oxygen outlets, so crew members can rest on the way to a target. The plane's cabin is sound-proofed more thoroughly than those of airlines.

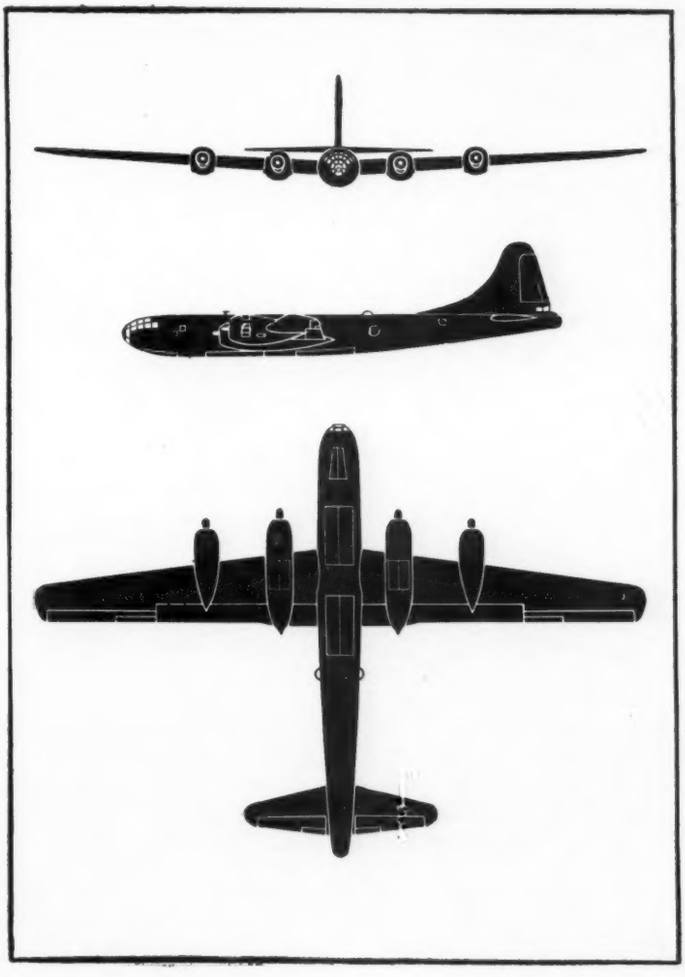
The pilot and co-pilot sit in a large glass-enclosed compartment where visibility is excellent; they can actually look down through the nose at the runway when shooting a landing. The bombardier sits at their feet and can talk with either without interphone. The engineer and radio operator are to the rear of the co-pilot, the navigator on the other side.

The bomb bay was designed and built in two sections connected by a novel catwalk. Crew members now crawl over it, but a small-wheeled belly cart such as that used by mechanics beneath automobiles may be installed in later models. Auxiliary droppable bomb bay tanks can be carried to extend the plane's range.

It is well protected by guns from all angles. It has new sighting equipment, and its gun and cannon installations are power driven. Crew members are protected by heavy armor plating.

In the development of the B-29, we have witnessed the beginning of a new era in aerial bombardment. It is the first of our AAF extra-heavy, extra-long range bombers that can strike our enemies in all parts of the world and it is destined to play a major role in knocking them out of this war. ☆

B-29 silhouettes.



AIR FORCE

THE OFFICIAL SERVICE JOURNAL OF THE U. S. ARMY AIR FORCES

Vol. 27 No. 7 July, 1944

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In order to provide space in the earliest possible issue for our initial coverage of the invasion, Cross Country this month is confined to the important information in this column.

FOR better coordination of our personnel functions in the field, a Personnel Distribution Command has been established in the AAF under command of Col. Henry M. Bailey, who is responsible to the Commanding General, AAF.

The new command will encompass the functions of the Redistribution Center, Overseas Replacement Depots, Convalescent Centers and AAF shipment supervisors. The Air Surgeon will determine medical policy in Convalescent Centers, as in other AAF medical establishments. Temporarily, headquarters of the new command has been established at Atlantic City, former headquarters of the Redistribution Center.

Although it had operational functions, the Redistribution Center was under the AC/AS, Personnel. The new agency assumes full command status, bearing generally the same relationship to AC/AS, Personnel as, for example, the Training Command bears to AC/AS, Training.

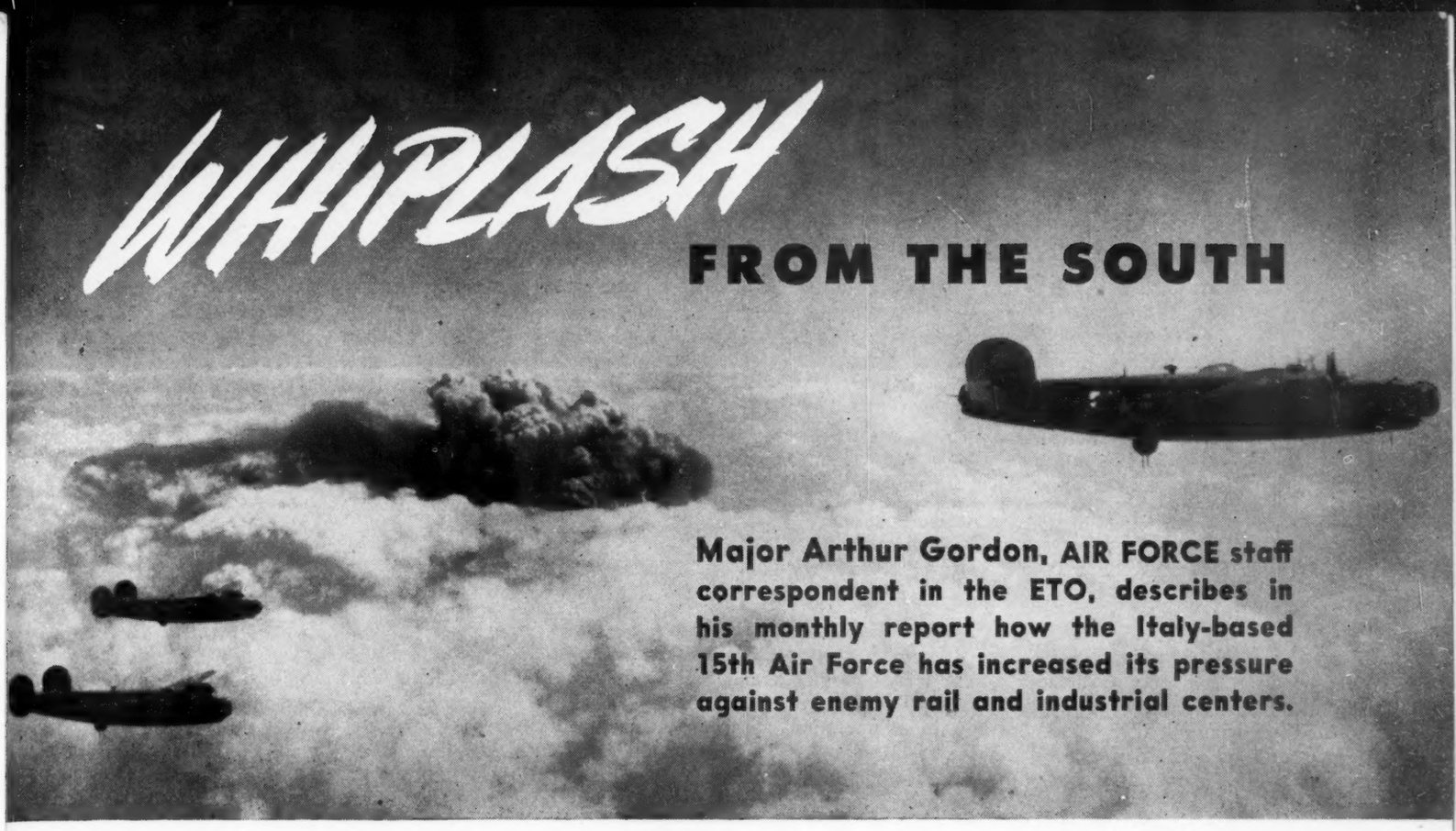
AAF GUIDE BOOK

The Official Guide to the Army Air Forces, scheduled for publication late in June (see story on Page 22), will be issued in a special edition for distribution to AAF organizations. This special pocket-size edition will be distributed through official distribution channels to AAF units in the United States and overseas for use as a reference and handbook and in AAF orientation, indoctrination and training programs. For individual use, the Official Guide to the Army Air Forces will be available at PXs and through commercial magazine and book outlets in a pocket-size book and a larger deluxe edition.

NEW PILOT TRAINING MANUALS

Eight pilot training manuals, four for the student and four for the instructor, have been compiled by the AAF Training Command in collaboration with Office of Flying Safety as a vital part in the standardization of AAF training. In addition to the pilot training manuals, the Training Command's Visual Training Department at Randolph Field is now putting the final touches on five manuals for bombardier training. Similar texts on fixed gunnery for fighter pilots and navigation are also nearing completion. Other manuals will be compiled covering all phases of ground school training.—THE EDITOR

WHIPLASH FROM THE SOUTH



Major Arthur Gordon, AIR FORCE staff correspondent in the ETO, describes in his monthly report how the Italy-based 15th Air Force has increased its pressure against enemy rail and industrial centers.

Striking evidence of the effectiveness of the 15th Air Force raid on the Ploesti oil refineries on May 5 is the 20,000-foot column of black smoke which can be seen billowing above the clouds in this photograph. The smoke could be seen 160 miles from the target.

ALTHOUGH figures on bomb tonnages may delight the heart of a statistician, they are usually cold, colorless things, and certainly the enemy is more concerned with the accuracy of our bombardiers than with the weight of missiles showered down. Nevertheless, statistics sometimes highlight a point and that is why it may be worth noting that during the first week of May, when the 8th Air Force was hampered somewhat by bad weather, the payload carried by heavy bombers of the Italy-based 15th Air Force exceeded that of the 8th by a substantial margin.

Yes, the 15th has come of age and, although it still is only about half as large as the Britain-based 8th, our force of heavies in southern Europe packs a tremendous wallop.

When ambidextrous strategic air forces came into being at turn of the year, with Lieut. Gen. Carl Spaatz bossing the show from England, the 15th was a very junior partner, employed as a boxer uses his left jab for rapid, bewildering blows to keep the opponent off balance and on the defensive. Britain-based heavies were the boxer's right hand, capable of delivering more ponderous lethal blows. The 8th, in other words, was the USSTAF's "Sunday punch."

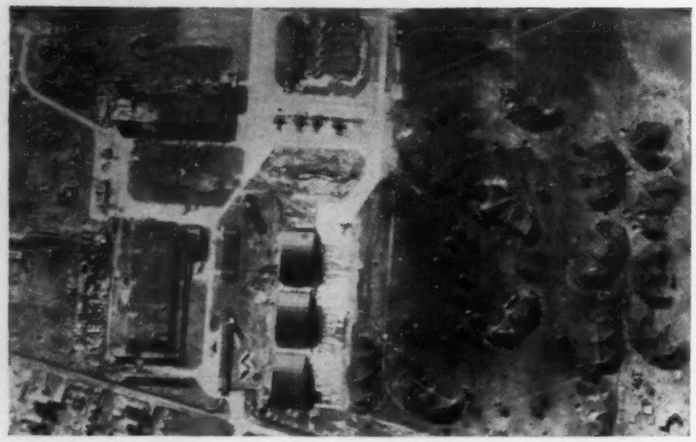
But as winter grudgingly withdrew from the Mediterranean, the 15th began to expand like an accordion. By the end of April, the number of its groups approximately trebled. Communiques on operations of the 15th began referring to forces of very great strength, which meant its air armadas were approaching the 750 mark. Weather was still disappointing as late as May 19 when the large part of the force attacking Ploesti had to turn back. But summer was coming and with six months of Italy-based operations under their belts—operations as versatile and flexible as any seen in Europe—Maj. Gen. Nathan Twining's men looked to the big push with enthusiasm and confidence.

MOVEMENT of the 15th Air Force to Italy in the autumn of 1943 was a triumph of logistics. Three main problems were transportation, establishment of airbases and the organization and activation of service groups. As soon as it was decided that the Foggia plains and heel of the peninsula were to be the new home of heavy bombardment planes, preparations were made to transfer some half-dozen groups which had been flying from African bases.

The main objective was to lose as little operational time as possible and echelons were divided into A and B parties. The advance party went forward, leaving behind minimum crews to keep the big ships flying until they hopped across the Mediterranean to their new bases. Although shipping space was at a premium, vehicles were rushed across in LSTs. Existing airfields in the vicinity had been badly battered. These were repaired and others were carved out of the soggy Italian plain. The engineering problems involved were enormous. Steel mats were essential for landing strips and perimeter tracks were needed to keep bombers from bogging down in the spongy turf. Roads had to be built that would support the volume of traffic necessary to maintain an operational base. Distribution of supplies inside Italy was a major headache. The bulk of equipment was landed at Naples where shattered port facilities were restored with brilliant efficiency by Army engineers. This equipment then had to be transported over the spiny backbone peninsula to eastern airbases. Sometimes the task of moving several hundred tons of steel mat from one side of a marshalling yard to another was more of a problem than getting the same shipment across mountains.

Fortunately, warfare in Africa had taught everyone, including the AAF, much about the difficult art of keeping mobile. Combat crews never once lacked material with which to fight. Bomb stockage was kept ahead of requirements. Gasoline was piped in and stored in adequate field facilities. Since the service of supply was operating primarily on the other side of the peninsula, the air force set up its own service of supply depot.

In the early days, while fighting equipment came through on schedule, there was little provision made for personal comfort. Living conditions were miserable. The boys munched C rations and



The reconnaissance photo above revealed that the Nazis were rebuilding components of their Messerschmitt works at Augsburg, damaged in the February 25 attack by the 8th Air Force. On April 13 the 8th struck at Augsburg again with the results shown at right: the three round roof hangars were completely leveled and direct hits were scored on large assembly shops, machine shops, warehouses and powerhouse.

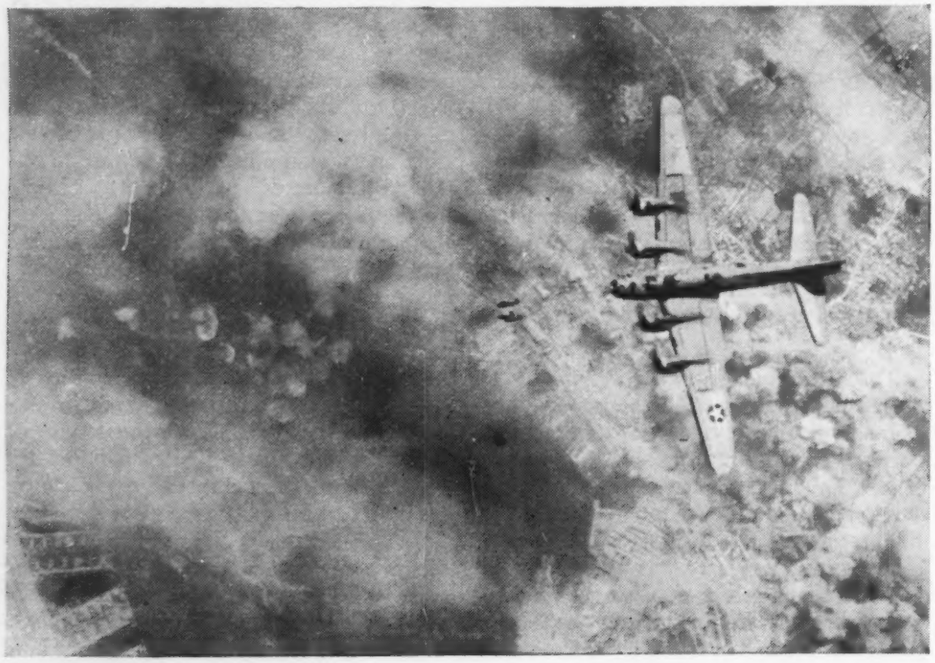
shivered in tents. Fresh meat was something which existed only in dreams, and even the dreams were sometimes restless because there were not always enough cots to go around. In such cases, ground crews lived up to their names and slept in bedrolls and pup tents in mud.

There was some doubt at first whether the number of groups called for in the expansion schedule could be supplied under conditions prevalent in the invaded country. When General Arnold visited the theatre, the A-4 section of MAAF told him that it was possible. "I hope you are right young man," said General Arnold, "I don't know what will happen to me if you are wrong, but I certainly know what will happen to you." A-4 kept his word and his job, and the flow of new groups through the staging area remained smooth and uninterrupted.

The first dramatic example of combined operations with Britain-based planes of the 8th Air Force came on February 25 when heavies of the 15th were flown over a joint target at Regensburg. Losses were high. The 15th fighter cover was not as extensive as that of the 8th and for that month the loss ratio of both air forces was over three percent of sorties flown. In succeeding months the 15th's losses dropped sharply to about one and a half percent. Their claims in enemy craft destroyed also were much lower than the 8th's and probably will drop still more as units of the Luftwaffe are shifted north to meet the invasion threat.

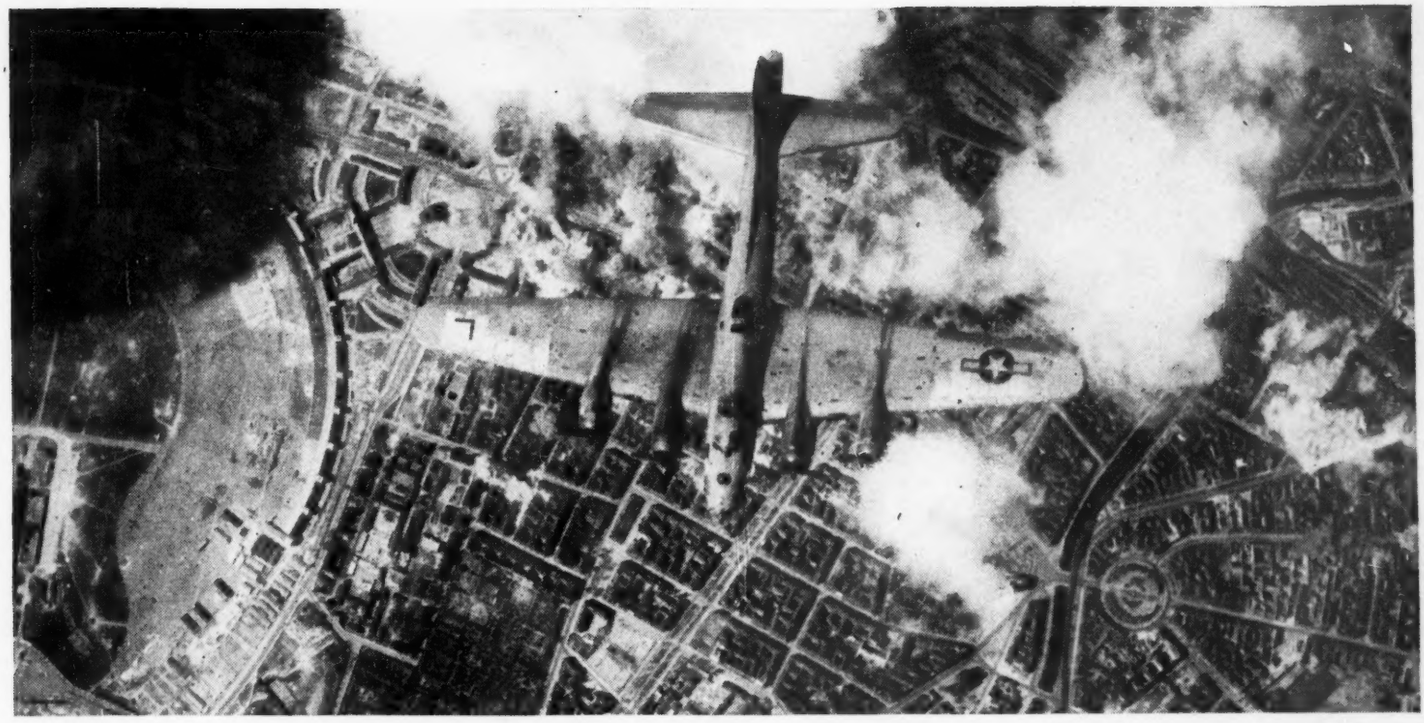
By April, with weather improving and green combat crews becoming battlewise, the 15th swung into full stride. On the second day of the month, 850 aircraft were dispatched within twenty-four hours, including several score night-flying RAF Wellingtons. One hundred and sixty-nine enemy aircraft were claimed destroyed. The main targets were the Daimler Puch aircraft factory and ball-bearing works at Steyr, Austria. The ball-bearing plant was badly damaged, a grievous blow for Germans who indirectly admitted a shortage of this vital material by claiming that ball-bearings salvage from Allied planes shot down was one of their chief sources of supply.

Bombers of the 15th Air Force are able to strike along the entire southern belt of Europe, from Bordeaux to Ploesti. Below, a B-17 of the 15th is shown dumping bombs on the naval base at Toulon on April 29. Despite heavy smoke screen, docks and warehouse facilities were damaged.

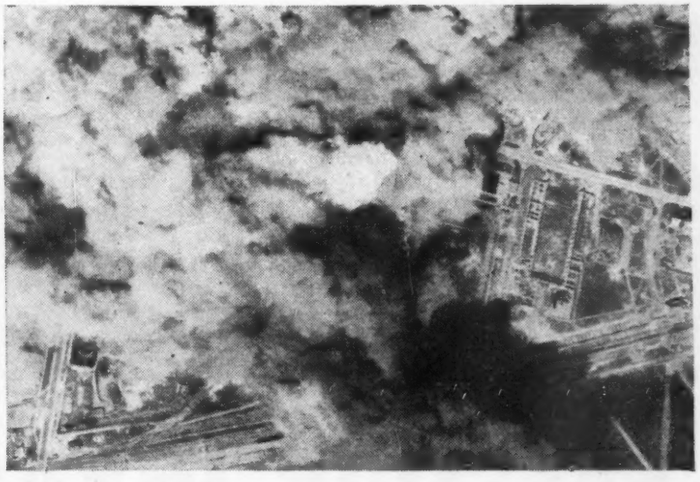


On April 3, aircraft factories and railroad yards in Budapest were attacked. On the 4th, marshalling yards at Bucharest received 800 tons of high explosives. On the 5th, Ploesti got its first plastering from Italy-based heavies — and so it went for the rest of the month: Belgrade, Sofia, Nish, Toulon—all were hit hard. On the 13th, the Hungarian Car and Machine Works at Gyor was almost obliterated in some of the finest precision bombing since Marienburg. The flexibility of air power was demonstrated by the ease with which the 15th Air Force, striking marshalling yards in the Balkans, could aid the Russian advance one day and on the next weaken Kesselring by cutting railroad lines as far north as the Brenner Pass. When the big Allied push began in mid-May, the heavies contributed to the disorganization of the enemy by bombing German headquarters north of Rome, the absence of enemy air opposition indicating the toll taken of the Luftwaffe in the bitter campaign of attrition that had been going on since the first of the year. Some observers saw in the manifold activities of the 15th, a blueprint of the program which the 8th might follow on D-day and thereafter.

Meanwhile, in England the 8th was



The striking power of the 8th and 15th Air Forces gives the Allies a terrific one-two punch at Germany. In the photograph above, a Flying Fortress of the 8th is shown participating in the April 29 attack on Berlin. Note the Nazi aircraft parked in the circular area at left.



This is the German aircraft factory at Weiner Neustadt near Vienna as it looked a few minutes before heavy bombers of the 15th Air Force swept in for an attack on April 23. The photo at right shows the thoroughness with which the target area was covered. Tool workshops were smashed, the main assembly shop was extensively damaged and the large machine shop was pounded heavily by the attackers.

relentlessly pursuing its pre-invasion program of achieving mastery of the skies by destroying the German air force in factory, in depot, on the ground and in the air. While the 15th was seeking out ME-109 factory complexes in southern Europe, the 8th was hammering FW-190 installations in the north and east, interspersing these attacks with blows at synthetic oil plants and the few remaining ball-bearing factories and the ever-increasing number of marshalling yards. The 15th operated nineteen days in April while the 8th operated twenty. Together, the two air forces flew a total of more than 17,000 heavy bomber and an equal number of fighter sorties, dropping some 43,000 tons of bombs—astronomical figures that represent an increase of over twenty percent above the previous month.

In May the tempo rose still higher. The 8th's thrust at Berlin on the 7th found the cloud-shrouded capital virtually undefended by Luftwaffe and only nine enemy aircraft were seen over Berlin. Out of the great American formation only eight bombers failed to return. The 1,200 tons of bombs (some three times the weight dropped on Coventry) must have stung the Germans badly because the next day, in similar weather conditions, they were up in force and thirty-six of our bombers were lost. On May 19, after a five-day lapse due to bad weather, another 2,000-plane thrust at Big B cost us 26 bombers and 19 fighters. One hundred and fifty-three enemy fighters were reported destroyed in the air alone.

Meanwhile, in both theatres the tactical air forces were steadily increasing the weight and variety of their offensive. Dive bombing, strafing and medium level bombing were employed almost daily to harass the enemy from Pas de Calais to the Italian front. All along the line the Luftwaffe opposition seemed gradually weakening.

In USSTAF headquarters in England a calm confidence prevailed on what proved to be the eve of invasion. There was no dissatisfaction with the number of planes on hand or the replacements being received. As far as the heavy bombers were concerned, the strength asked for had arrived both in Britain and Italy. The job for which that strength was destined was being accomplished. ☆

B-26s of 9th Air Force head out to North Sea after medium altitude bombing run over enemy installations at Ijmuiden, Holland, March 26. A year earlier, before present technique was developed, all of ten Marauders bombing same target from minimum altitude were destroyed.

OUR INVASION AIR FORCE

By Capt. Luther Davis

AIR FORCE Overseas Staff

THE 9th Air Force is like a fighter who has been winning every round with one hand tied behind his back.

Just how well it is doing one-handed may best be observed from a plane over the English Channel. From that vantage point you usually can see masses of B-26s and A-20s approaching or leaving the enemy coast and you may be able to spot some of the fires they have started in France, Belgium and Holland.

P-47s leap and play across the channel like happy airborne porpoises. P-51s and P-38s scramble to and fro on every sort of mission from escort to dive bombing. Reconnaissance planes leave vapor trails in the sky as they buzz between shores.

Although its activity constantly is on the increase, the 9th's losses are phenomenally low. In its first six months of operations from England, only 100 of its planes were destroyed in Europe or over the channel.

So successful were bombers of the 9th in their first two months of Western European operations, consisting mainly of attacks on airdromes, that they were assigned against what communiques called "military objectives" and what the press guessed were rocket emplacements.

Three months later the 9th, with its B-26s supplemented by fighter-bombers and A-20s, directed its thunder against marshalling yards in Europe. The connection between marshalling yards and invasion was obvious to all, including Generals Von Rundstedt, Dietmar and Rommel, who had thought to use them in counter-invasion measures.

BY the end of May, the 9th had battered German aviation, communications and coastal installations to a point where it was ready to use its other hand and deliver the knockout blow. It must not be

Faced with an enormous task in the invasion, the bombers, fighters and troop carriers of the 9th Air Force were ready for the big test.

inferred that pre-invasion softening of the channel coast was solely an achievement of the 9th Air Force. Working closely with the 9th was its teammate—the RAF Second Tactical Air Force. Together they form the Allied Expeditionary Air Force. The heavies of the 8th also helped pulverize the Westwall, taking time off from blasting targets deep in Europe.

The Allied Expeditionary Air Force is the greatest aerial team the world has known. The British portion was to support the invading British ground troops while the 9th was to provide cover for U. S. ground forces.

The task assigned the 9th is an enormous one. It had to be prepared to move into Europe with the invaders, give them air support and defense, carry large numbers of troops into combat and build, maintain and protect its own airfields.

Such a big job required a vast organization. In administration of the 9th Lieut. Gen. L. H. Brereton, the commanding general, is assisted by Maj. Gen. Ralph Royce, deputy commander. Heading the components of the 9th are Brig. Gen. Myron R. Wood, Service Command; Brig. Gen. Samuel E. Anderson, Bomber Command; Brig. Gen. E. R. Quesada, Fighter Command, and Brig. Gen. P. L. Williams, Troop Carrier Command.

Coordination within such a large organization of dissimilar units and cooperation with naval and ground forces as well as the other air forces presented a difficult problem.

While 9th Air Force headquarters is ultimately responsible for liaison, it is assisted by a mobile advanced headquarters. The latter unit was to move with the invasion troops and keep the 9th's plans well meshed with those of the RAF Second Tactical Air Force and the 8th Air Force in order to provide ground forces with the ultimate in aerial service.

One of the 9th's largest components is its Troop Carrier Command. Although it had not operated against the enemy in the ETO prior to the invasion, this biggest of the Allies' troop carrier organizations was ready for the question. The scale of the TCC's training is indicated by the fact that in five weeks it carried over 3,600,000 pounds of freight in addition to hundreds of special troops, all in maneuvers preliminary to D-day.

For the invasion the 9th's Fighter Command was to be a complete light air force which would work in close cooperation with the ground troops.

Bombardment Methods

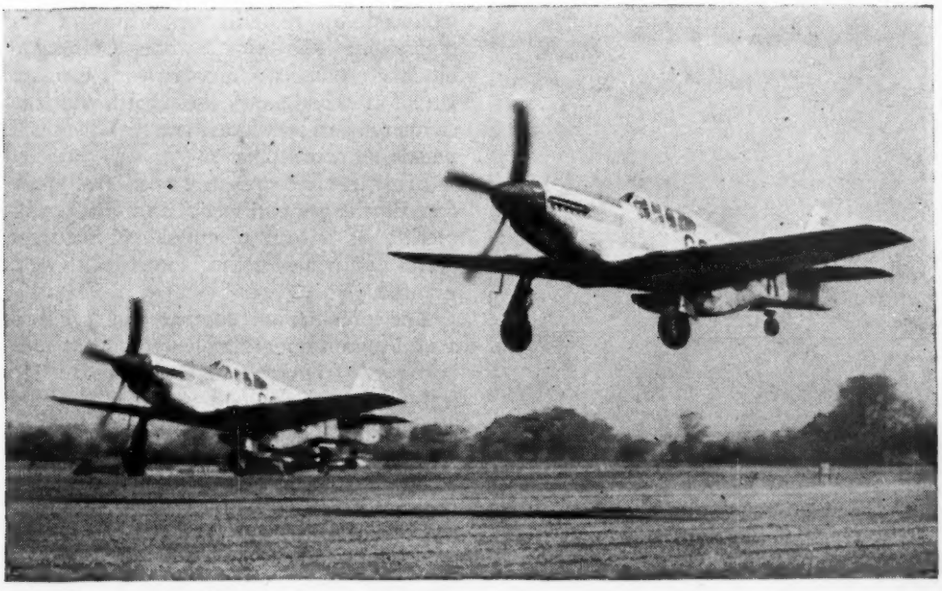
PREPARING for D-day, the 9th's Marauders repeatedly attacked objectives which from the air appeared no larger than a lieutenant's new moustache. To make the job even more difficult, the pinpoint targets were usually in the middle of Nazi-occupied French, Belgian or Dutch towns where inaccuracies would result in death to hundreds of our friends.

They were the kind of targets which some experts said could be hit only by low level bombing. This tactic was tried when the Marauders first arrived in England. Ten went over Ijmuiden, Holland, at zero altitude and all were downed by the Nazis. It was admitted that some method must be devised for obtaining minimum altitude accuracy from medium height.

The problem was solved not by development of an intricate device but by intensive training in navigation and precision bombing.

In order to avoid heavy flak concentrations, the B-26s and A-20s snaked their way across Europe at 12,000 feet or thereabouts, sometimes making five sharp changes of direction before reaching the initial points. Turns had to be made at

P-51Bs, a pair of which are seen taking off from a base in England, are playing an important role in the success of the 8th and 9th Air Forces. Capable of exceptional range, altitude and speed, the easily-maneuvered Mustang is used for fighting, escort, dive bombing and strafing.



the right places or a formation would find itself running into flak instead of away from it. This situation required precise navigation to several positions, a job made no easier by the fact that often a formation was almost continually engaged in evasive action.

Success of the 9th's Bomber Command has been due in no small measure to the insistence of its commander, General Anderson, that air crews be kept intact. To achieve this ideal of smoothly working combat teams, crewmen had to take their furloughs or leaves simultaneously and squadron and group commanders had to ground an entire crew if one member was on the sick list.

Each crew assisted the scheme by correcting faults of individuals within its own organization, thereby obviating the necessity for shuffling of personnel.

The training program of the 9th was an arduous one. Often men came back from missions over Holland or France, brushed flak particles out of their hair and took off for training flights to check formation flying, navigation or gunnery.

The standard operating procedure at the B-26 bases called for men to fly double headers—two combat missions daily, the first of which probably was briefed before dawn. In the beginning all griped their heads off. Later they reached the point where they felt let down if they didn't fly six or eight hours out of every twenty-four. Such a schedule kept maintenance crews constantly on the go.

One of many vital blows against the Nazi transportation system was struck April 11 when B-26s of the 9th Air Force attacked railroad marshalling yards at Charleroi, Belgium. Dense clouds of smoke are seen rising from burning rolling stock, locomotive roundhouses and repair shops.

Nazi communications were further disrupted when the 9th's Marauders bombed the rail junction at Hasselt, Belgium. Destruction seen in track area halted movement of military supplies on Antwerp-Maastrecht-Aachen line. One of the bomb craters was 150 feet long and 40 feet wide.

Ground schooling was a required part of the strenuous program. On a non-operational day, all aircrew members were given a minimum of ten hours in classes and, regardless of the flight schedule, each airman put in at least an hour each week on basic synthetic devices such as the shadowgraph, Link trainer and bomb teacher. All hands were checked on procedure, skeet shooting and the Hunt trainer.

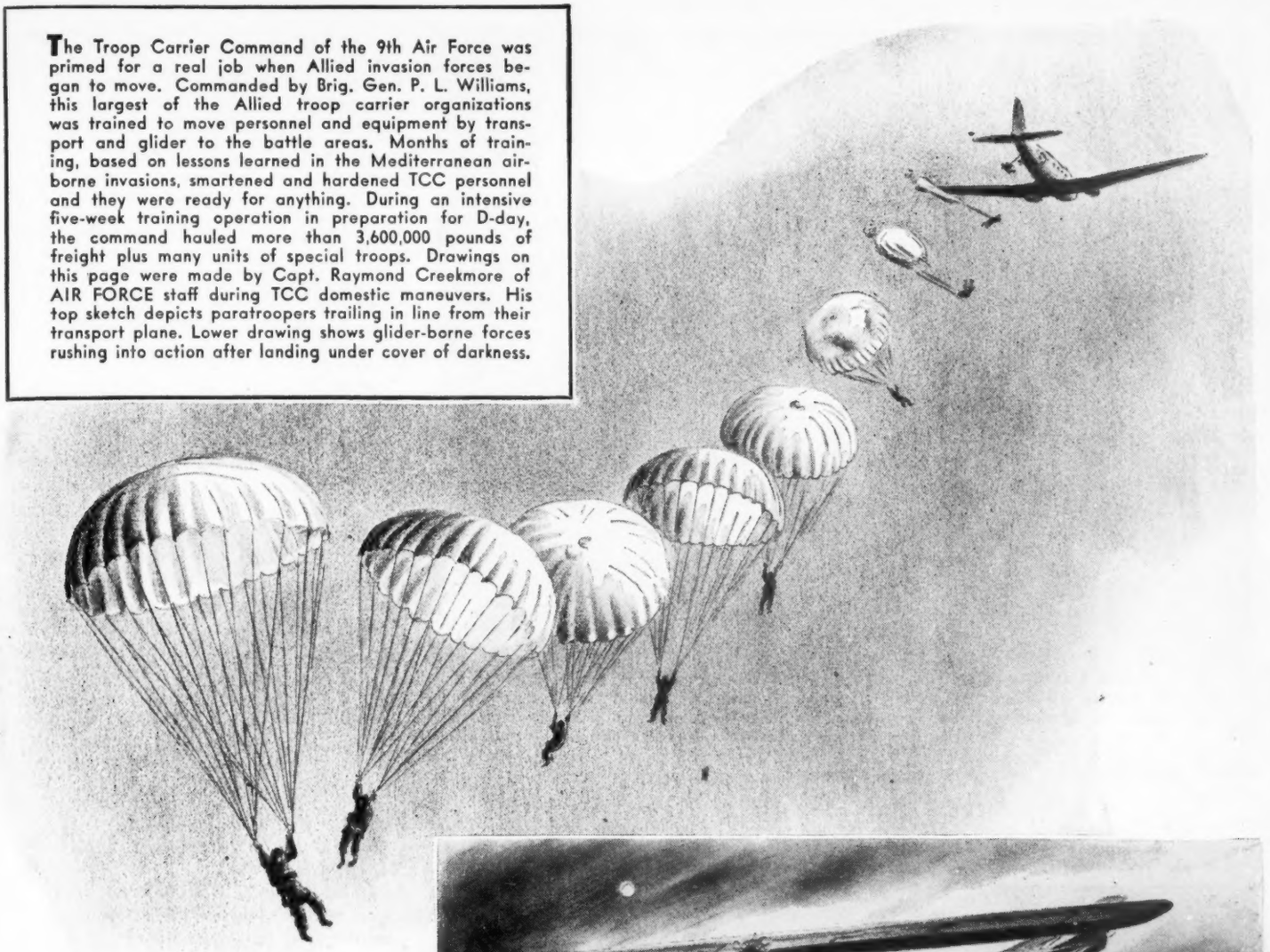
The heavy work program, however, was balanced by periodic opportunities for recreation. The 9th's Bomber Command has many officers who were with General Brereton throughout the North African campaign and they knew exactly how much personnel could take.

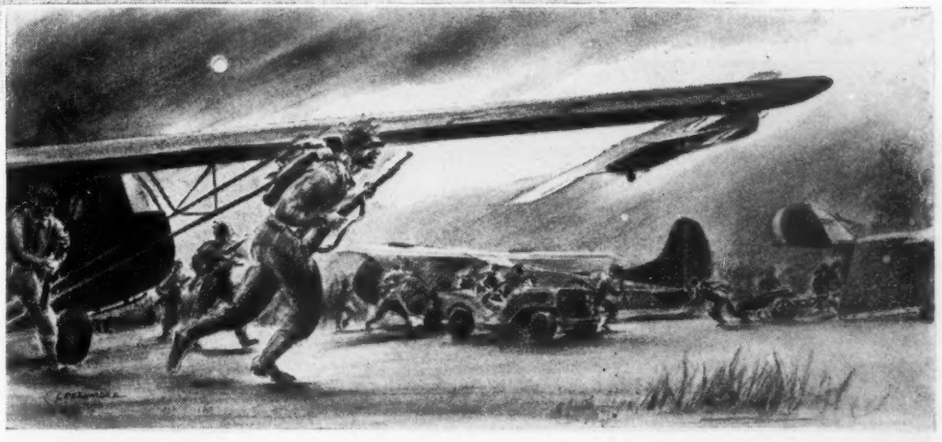
Every combat crew received two days' free time every two weeks and, after completion of a tour of missions, fortnight leaves and furloughs sometimes were granted.

The pressure of combat was relieved also by non-operational flying, an idea borrowed from the 12th Air Force. To tighten formations and improve bombing accuracy, each group at infrequent intervals devoted a week to practice.

During these non-operational runs, the group CO or someone he selected rode herd on the formation in a control plane that followed but did not join the others.

The Troop Carrier Command of the 9th Air Force was primed for a real job when Allied invasion forces began to move. Commanded by Brig. Gen. P. L. Williams, this largest of the Allied troop carrier organizations was trained to move personnel and equipment by transport and glider to the battle areas. Months of training, based on lessons learned in the Mediterranean airborne invasions, smartened and hardened TCC personnel and they were ready for anything. During an intensive five-week training operation in preparation for D-day, the command hauled more than 3,600,000 pounds of freight plus many units of special troops. Drawings on this page were made by Capt. Raymond Creekmore of AIR FORCE staff during TCC domestic maneuvers. His top sketch depicts paratroopers trailing in line from their transport plane. Lower drawing shows glider-borne forces rushing into action after landing under cover of darkness.





The control officer kept the radio hot with helpful and sometimes unflattering comments on formation work. But it all was taken in good spirit because everyone knew that the control officer, whatever his rank, would be in the pack and probably receive his share of criticism the following day.

Non-operational weeks were popular with the flyers. Men, who for long months had made all their take-offs with 4,000 pounds of high explosives in the bomb bay and who had forgotten that it was fun to fly, keenly appreciated the joys of handling a light ship and of being released from a tight time schedule.

Mustangs of the 9th

A POTENT factor in the successful operations of both the 8th and 9th Air Forces has been the P-51B, which is used for bomber escort and for high and low altitude fighting, dive-bombing and strafing.

Deep in German territory recently a pack of the Luftwaffe's best pilots managed to sneak into the sun and gain a position over one of our Mustang formations. Flying at about 32,000 feet, the Nazis, giggled through their intercoms as they got set for the kill.

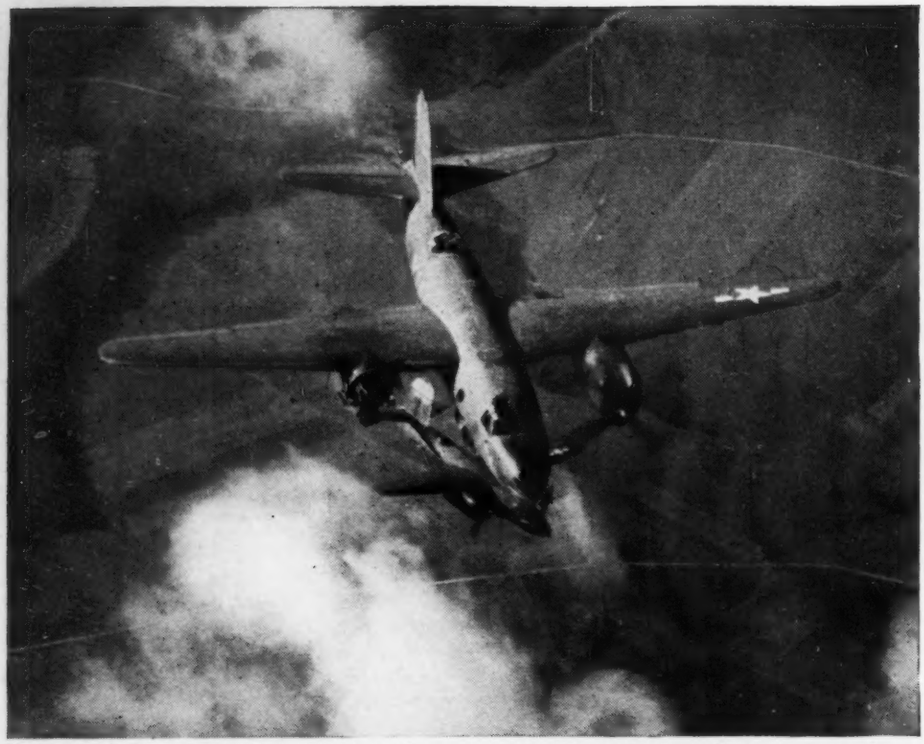
But the Germans' dream of a field day was cut short when the fabulous Mustangs speedily climbed 5,000 feet, chased the enemy planes all over the sky and destroyed most of them. The Hun might have recovered more readily from that setback if the same P-51Bs on their way back to England hadn't rubbed it in by hitting the deck and strafing railroad rolling stock.

In discussing his plane's speed, range and maneuverability, a P-51B pilot uses only superlatives. He will swear his ship can outperform any other fighter in the world.

The AAF first used the P-51 in combat in the Mediterranean area. Its performance at less than 10,000 feet was so good that technical experts decided to try substituting a Rolls Royce engine for the Allison motor in an effort to produce a high altitude fighter.

In the autumn of 1943 the initial shipment of the high altitude ships was received in England by an AAF fighter group which had been trained in Airacobras.

A few weeks later the new Mustangs were sent into action against the enemy for the first time. But advance notices of the P-51B's power must have reached the Luftwaffe. Over Emden, six enemy fighters, preparing to attack our heavies, turned tail and fled when the Nazi pilots spotted the Mustangs. *(Continued on Next Page)*



Victories of the 9th Air Force are not always gained without the loss of some of its planes. Seconds before this photo was made, the B-26 in the foreground sustained a direct hit from a Nazi flak battery and its right engine was shot away. The pilot kept the crippled Marauder on an even keel and a steady course until his crew and, finally, he bailed out safely. Another B-26 is seen continuing toward its target, unscathed by the withering bursts of enemy anti-aircraft fire.

Camouflaged for the night is this P-51B, seen through a tent opening at a 9th Air Force base in England. Naturally, an enemy pilot would rather destroy a Mustang on the ground than meet one in the air, for he knows the odds are against him when he mixes with the speedy fighter.

The first real test of the P-51B came January 5, 1944, when the Mustang-equipped group escorted bombers to Kiel and mixed with enemy fighters for almost an hour. In destroying eighteen Jerries, the American group sustained not a single loss.

This pioneer Mustang group in England broke the American ETO record by shooting down its first 100 planes in 83 days. In its first five months of operations, it destroyed 253 enemy planes in the air and on the ground. Its own loss was approximately one-fifth of that amount.

Members of the group modestly admit that the secret of their success is the plane's magnificent performance. Tactically they have no secret weapon or trick but in all their operations they emphasize mutual support. Their creed is that the wing man stays on the wing, that the teamwork of the group is of paramount importance and that if one of them is in trouble another must come to his aid.

The Mustang boys neither claim that teamwork is original with them nor that they are responsible for any innovations. They fly escort the same as other fighters and dogfight about the same, with the exception that they would rather clobber Jerry's tail off than attack headon, for the P-51B's armament is light compared with that of the P-47 or P-38.

As a dive bomber the Mustang's performance is distinctive but not revolutionary. Usually P-51B pilots begin a dive at about 12,000 feet and keep as steep as possible, 70 degrees being customary. They release their bombs somewhere between 4,000 and 6,000 feet and whiz from the target area at 500 or 600 miles per hour. On dive bombing missions two 500-pound bombs are usually carried instead of wing tanks but no armament is sacrificed.

Naturally, some mechanical difficulties presented themselves in the early days of P-51B operations. Many of these were caused, however, by the fact that there were no tech orders on the new model and maintenance crews had to feel their way along.

For instance, propeller seals leaked. After all sorts of remedies were tried, a mechanic solved the problem by boiling the seals in oil for fifteen minutes. His method was SOP until new type seals arrived.

Gun stoppages occurred at the rate of one in every 150 rounds until a master sergeant of the ETO's pioneer Mustang group invented a gadget that keeps ammunition feeding no matter what the stress on the chute may be.

There were other troubles but most of them were ironed out in the field and the P-51B long has had a clean bill of health, except for one feature. Mustang missions average four and one-half hours and the pilot's seat is a wooden one. ☆

Leaving a target several thousand feet below engulfed in smoke and flames, a trim A-20 of the 9th Air Force is shown streaking for its home base after a recent attack against one of Hitler's invasion defenses on the Continent. Tne versatile A-20s, operating from England, form a component of the 9th's mobile bombing force which, in addition to blasting Nazi airdromes, rail lines, bridges and shipping, is prepared to support Allied ground forces when they invade the Continent.

NAVIGATORS CAN'T DAYDREAM

The job of navigation is tough at best; don't make it more difficult with overconfidence and laziness.

THE B-17s were about an hour out of Frankfurt. There had been no fighter opposition. The flak was light and ineffectual. Flying conditions were perfect. It was one of those dream missions.

But not a bomb was dropped on Frankfurt that day.

Because of sloppy navigation, the flight didn't come anywhere near its target. The striking power of more than 100 B-17s was completely wasted. Actually, their bombs finally were dropped on a target in France but it was little more than a we-had-to-bomb-something gesture.

The trouble started with the navigator in the lead ship. He had depended entirely upon his flight plan instead of watching his direction and checking on it regularly. A sudden windshift had pushed him 95 miles off course, but he was completely unaware of the change in the forecast winds. When his plane was forced to turn back due to engine failure, he was unable to give the deputy group navigator a precise indication of the flight position.

But the deputy group navigator was just as bewildered. He had been playing follow the leader, and when the lead ship turned back, he too was lost. He called the lead navigator of the following group and asked for the proper bearing. But that navigator was just along for the ride. He had relied upon the lead navigator and hadn't bothered to chart his position.

Almost unbelievably, the same was true for every navigator in the flight. They all had depended upon their leader—and they were lost too.

The mistakes are painfully obvious. The lead navigator erred in using only one method of navigation. He should have kept a close check on his winds and used every navigational aid at his command to determine his position. And the other navigators should have been plotting the course. The series of circumstances which made this mission a complete failure came from overconfidence, laziness and plain inefficiency. The worst part of the failure was that the navigators knew better.

Mistakes are apt to happen to the best airmen. But there is no excuse for failure when you have sufficient ability and training to avoid error in the first place. The incidents reported here—as told to an AIR FORCE staff writer—come straight from the navigators who made the mistakes and admit that they should never have happened.

Take the case of the navigator who was leading a practice flight over England. His radio operator asked for a QDM and got a QDR instead, indicating the presence of a balloon barrage. The navigator simply failed to plot the bearing given him. If he had, he would have realized that he was leading his flight over a restricted area. His lapse resulted in bringing the flight directly over the heart of London at 1,200 feet in perfect visibility. As he tells it, "our bomb bay doors were open, and if one of our practice bombs had fallen, we would have been blown right out of the sky. I could see the AA batteries tracking us as we came over. I made a fast correction and we turned right over Buckingham Palace. It was fortunate for us that the visibility was good and they recognized us. Else we surely would have been shot down for being where we shouldn't have been."

All this navigator had to do was plot a given course. He figured he could follow his QDM right into the field. A simple error, but it could have been fatal.

A situation where laxity in checking signals did result in a fatality took place under somewhat similar circumstances. A Fortress coming into England from the States was supposed to pick up a radio beam near the coast and follow it in to the proper airfield. The navigator picked up a station on the correct frequency and without bothering to identify the call letters, he instructed the pilot to follow its signal. They flew 120 miles off course to the station sending the signal, but there was no airfield available. They had to turn back to the original field, but they were low on gas. A crash landing resulted and a crew member was killed.

The navigator had failed to identify properly the call letters he had received. What's more, he should have had a complete knowledge of the call letters of all the stations in the vicinity. It seems to be the simple things which cause most of the trouble. Consider the case of a lead navigator who just didn't remember his instructions. Six B-24s set out to attack dock installations on the middle eastern coast of China. The flight plan called for them to come in south of the target until they reached the coast line, make a sharp turn and follow the coast to the target. The pilot of the lead ship was told that if he found any enemy shipping which would make good targets of opportunity, he should swing out to sea instead of coming up the coast. The flight was informed of this attack alternative.

When the flight hit the coast, the lead plane continued out to sea and the bombardiers in the following planes started searching the ocean for enemy shipping. Then, without warning, the lead plane turned back directly over the dock area. The bombardiers were not prepared for this sudden move and they had no opportunity to see the installations they were supposed to hit.

The lead navigator had failed to correct his deviation at the right time and the right place. He instructed the pilot to swing out over the ocean so that he could have an opportunity to correct his course. He forgot that the turn meant so much to the bombardiers. The target was missed completely.

EVERY navigator knows that there are many safeguards which can be used to correct for compass deviation. Yet, in many instances, they expect the lead navigator to make those corrections, and if he is wrong the entire flight suffers. Such was the situation when a flight of B-17s took off to bomb Sofia, Bulgaria. The lead navigator did not correct his compass properly and 125 planes overshot their target. Not one navigator in the flight used any of the available precautions.

One of the men explained what could have been done. "First of all," he said, "we should have used our astro compass and found our true heading from the sun. Or we could have found the compass deviation by comparing the true course actually established from ground check points, making allowances for wind drift, and then using that wind drift and comparing the first course with the course established by the compass heading. Actually, we all depended too much on our magnetic compasses without checking them. All we had to do was swing our compasses celestially in the air and on the ground more frequently."

Even the most experienced men have been known to make the same old mistakes. Consider this story from an extremely red-faced navigator. "I was supposed to be checking out two navigators in England," he reported. "We were flying low, circling airfields, but I didn't pay any attention to where we were going.

Suddenly it got dark—it does that in England—and my pupils informed me that they did not know where they were. The pilot asked me how to get home and I didn't know because I had not been watching. There were no lights, no landmarks, and we were lost right over our own territory on a flight in which I was supposed to be checking on proper navigation. The pilot brought us in on a VHF bearing—but it could have been serious."

There is nothing anybody can do for you if you make mistakes like that. As one instructor put it, "We can give them a handkerchief and tell them to blow their nose, but we can't do it for them."

Then there was the navigator in a B-24 on a trip from Hawaii to Christmas Island. It was a daylight flight with no moon. Under such circumstances, the navigator could use only sun lines to determine his location. This navigator took his last sun line approximately a hundred miles out of the island and gave his pilot a 140-degree bearing with instructions to fly for forty minutes on that bearing. Then he told him to turn in on the sun line and he indicated the maximum time of arrival.

The pilot had his radio compass on and realized that he was going away from the island rather than toward it. He reversed direction and split the airfield in two. Mistake: the navigator had not allowed a sufficient margin of error in plotting his landfall. He allowed only a sixty-mile error whereas it should have been at least a hundred. The plane was coming in to the right of the island, and the navigator called for a turn to the right—away from the base. He also made a second mistake. He did not use all the facilities available to him. If his radio had been on, the mistake never would have been made. It is the navigator's job to make the radio check—not the pilot's. He figured he was a hot navigator and he failed to make use of all the navigational methods available. He could have used radio beams, sun lines, radio fixes, checked his forecast winds and read drift. But he didn't. And if the pilot hadn't been on the ball, the crewmen would have practiced their ditching procedure for keeps.

THIS business of being a hot navigator keeps popping up. A B-24 hit the coast of New Guinea on its way back from bombing Wewak. The navigator thought he was to the left of Port Moresby when actually he was to the right. In that area, there are few landmarks and you have to be able to recognize the coast line. The navigator studied the coast and instructed the pilot to turn to the right. The pilot flew in the direction indicated until the ship got low on gas. Then he got a DF bearing and discovered that he was going in the wrong direction. He reversed his course and made home on two engines.

The navigator thought he knew where he was going but he did not want to admit that he might be wrong. He was afraid to use his radio because the pilot might have thought that he was lost and that would reflect on his ability. He didn't want to appear to be lost in broad daylight—so he took a chance. The radio is there for you to use. No pilot will think less of your ability if you use every navigational means at your command.

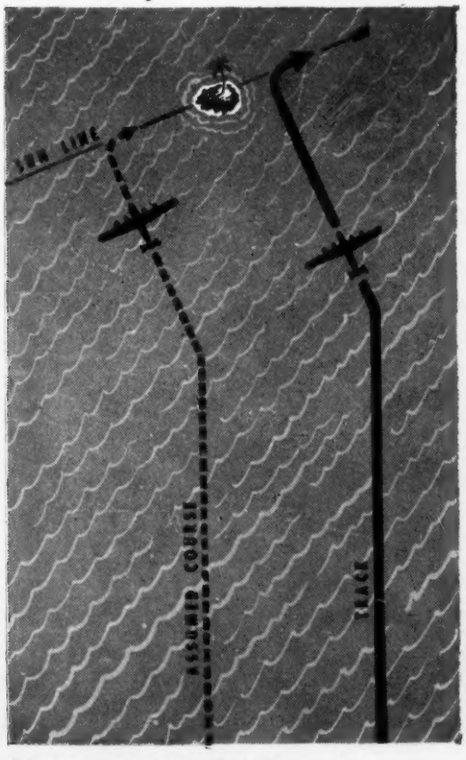
Some navigators seem to work under the assumption that flight plans, like pie crusts, are made to be broken. A flight plan is selected with scientific accuracy, taking into consideration such factors as enemy fighter fields, flak belts and radio detection stations. Yet some navigators want to win the war their way and they make up their own course in preference to the one they are instructed to follow. A gunner from the Mediterranean theatre tells this story:

"We were returning from a flight to Innsbruck, Austria, and the navigator brought us back over the Adriatic coast. Our flight plan called for us to fly down the middle of the Adriatic but this navigator had his own ideas. Maybe he wanted to test out the enemy's flak installations for he brought us right over the heaviest flak belt I ever saw. Over Yugoslavia we ran into a lot of fighters who probably never would have found us if we had stuck to our course."

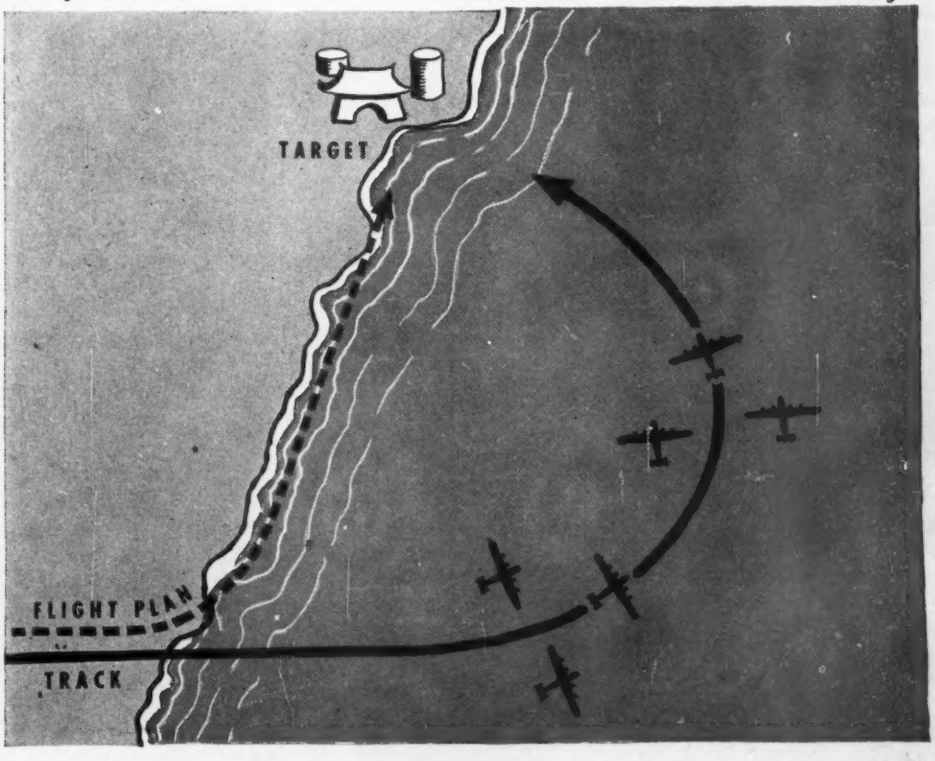
The point here is that this is not an unusual case. There was the navigator in Italy who brought his flight over Leghorn for no apparent reason. He wasn't lost, he was just stubborn. Leghorn was protected by a great many flak batteries, and two ships were shot down. It never would have happened if he had stuck to his flight plan which recognized this enemy stronghold and by-passed it.

A navigator's job is tough enough without making it more difficult. Any man can err—the trick is to be aware of what might happen and take the proper precautions. That's the opinion of the men who made the errors and are willing to talk about them. You may not have a chance to make a second error. ☆

Far to the right of his base, the navigator gave instructions for a turn to the right. He failed to allow a sufficient margin of error.



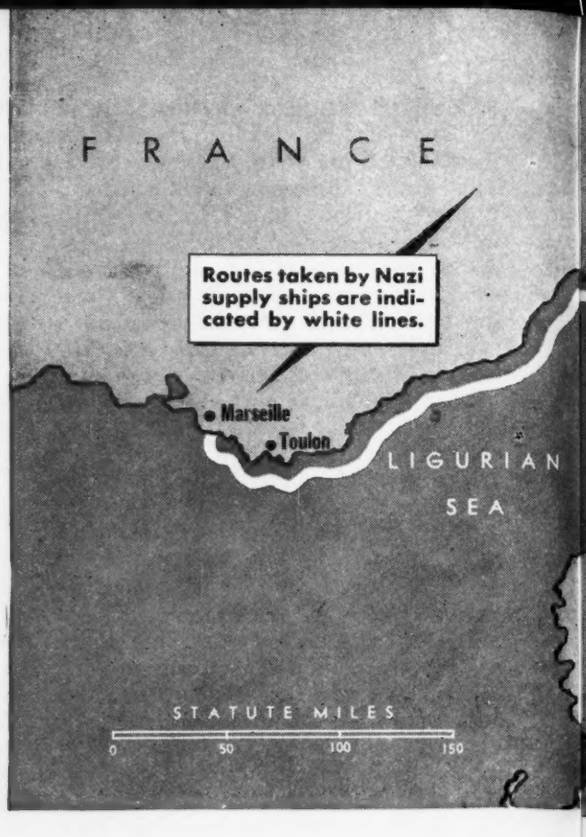
Given a choice of two flight plans, the lead navigator didn't follow either one. He confused the entire formation and missed the target.

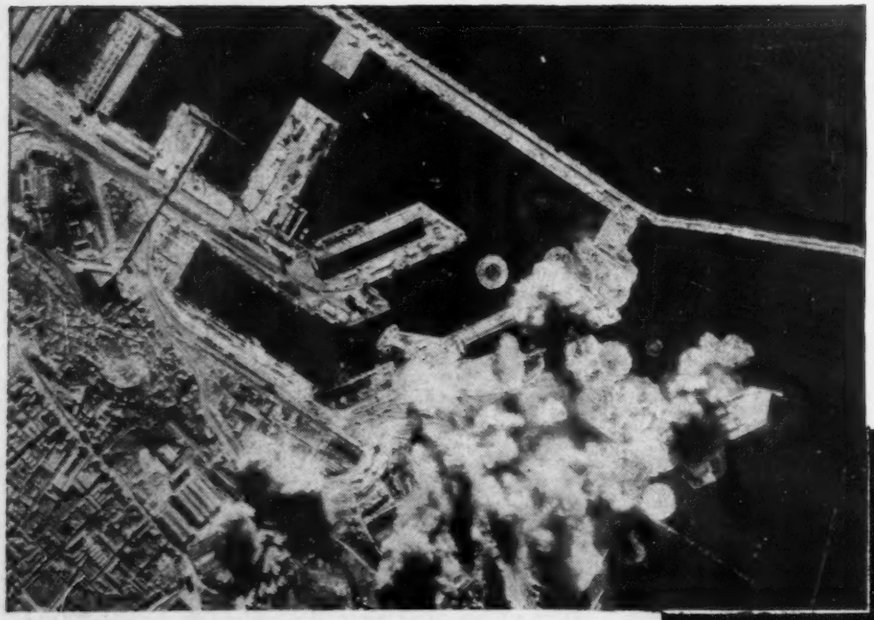


PITCHING STRIKES AT ENEMY HARBORS IN ITALY

German supply trains which normally run over northern rail routes into Rome have been bottled up by MAAF bombers since March 24. The bombers have strangled rail communications so effectively in northern Italy that the Germans have been forced to resort to round-about shipping routes.

But as the Nazi has turned to the sea so has the MAAF, and Allied bombs are now ripping into German-held Italian harbors, smashing dock installations and adjacent rail yards. Coastal bombers based in Corsica and Sardinia have halted enemy shipping by daylight down the northwest coast of Italy, which means that the Germans are now forced to do most of their shipping at night. From both sides of the Italian mainland, the Nazis have been sneaking supplies along the coast and shuttling them into their harbors before dawn. Nevertheless, MAAF bombers are making it tough for German boats, even under cover of darkness, to land vitally needed cargoes. ☆

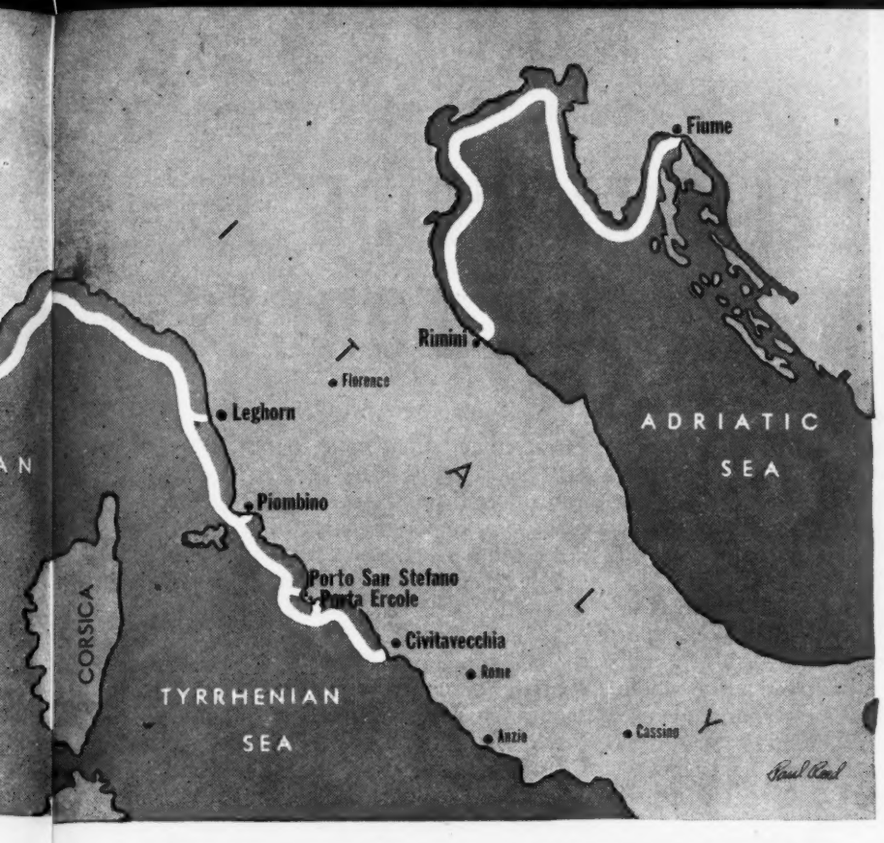


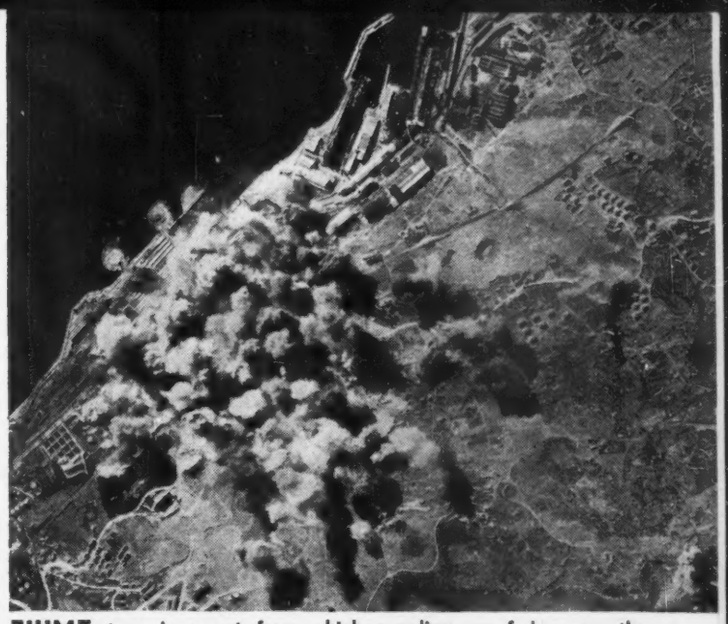


MARSEILLE is the Nazi's most important supply outlet from southern France. This photo affords an excellent view of the harbor and submarine pens under attack by B-17s.

LEGHORN. Six ships, 390 freight cars, extensive harbor installations were smashed in this attack. Bombed effectively in the photo below are: (A) coaling basin, (B) terminal yard, (C) oil storage, (D) barge basin, (E) harbor warehouses, (F) grain elevator and (G) additional warehouses. First bombed by B-24s last summer, Leghorn harbor has been struck repeatedly.

SAN STEFANO. B-17s did a good job on the harbor area in this attack. Photo interpreters estimated approximately half of the eighty ships in the harbor were destroyed. A rail tunnel, feeding into the Rome-Leghorn line, was blocked.





FIUME is a key port from which supplies are fed across the Adriatic. Flying Fortresses are shown pummeling the harbor and its facilities which include oil refinery, torpedo factory and rail lines.

PIOMBINO. Marauders are busy dropping 1,000-pounders on the coastal railroad lines, marshalling yards, steel mills and harbor facilities.

RIMINI. Adjacent to the harbor is a large rail yard on which the Nazis depend for moving supplies to front lines. In a twin attack both harbor and rail yard were bombed by MAAF Liberators.

PORTO ERCOLE. On March 20, B-26s came in low over the harbor, pasted dock facilities, starting fires. Note "F" type landing craft at jetty.

CIVITAVECCHIA. Barely visible against the Tyrrhenian Sea, B-25s wheel away from Civitavecchia after bombing the harbor. Bomb hits started fires along the entire length of the mole.

THE OFFICIAL GUIDE TO THE ARMY AIR FORCES

EVER since the Army Air Forces began its tremendous wartime growth there has been need for a single book to tie together, as a source of reference, the many components of the global network we call the AAF.

Such a book, of necessity, would have to be authoritative. It would have to be comprehensive without burdening itself with excessive detail. It would have to be well-balanced and readable. If possible, it should have a freshness to its presentation.

Its basic objectives could be explained as follows: (1) to provide a concentrated, handy source book for quick reference; (2) to afford each member of the AAF a clear insight into the importance of his own job and how it fits into the entire pattern of our operations; (3) to supply a concise medium for orientation and training purposes; (4) to lend historical perspective to current operations.

There was ample reason why such a book should be designed for those out of uniform, as well as for those in the service, why it should be written not only for the men and women of the AAF but also for their relatives and friends and for the many civilians whose work is directly allied with the AAF. General Arnold has explained: "Fundamentally, the AAF is a people's air force, and its bombs dropping on the enemy represent the work of millions of Americans in and out of uniform."

Thus, there was added another requirement—the book would have to be popularly styled for general readership, would have to explain in basic terms the whole giant AAF pattern of men and planes, supply lines and airbases, tactics and techniques. To this was added a final requirement—that the book have as widespread distribution as possible.

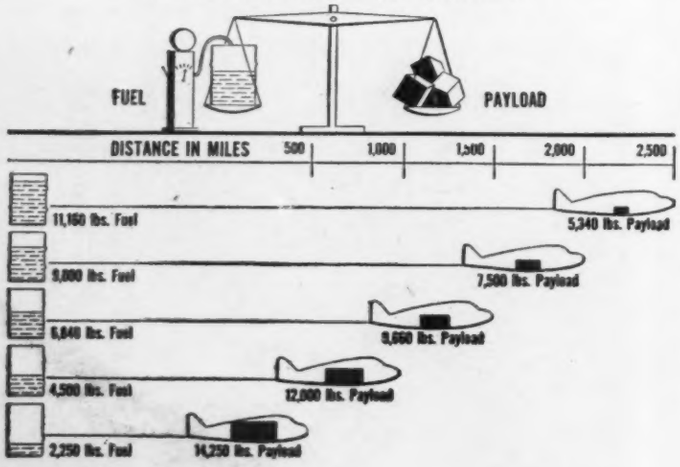
The result is *The Official Guide to the Army Air Forces*. The Official Guide will be available in late June to both service personnel and the public. It appears in two editions, one a pocket-sized 25-cent edition, the other a deluxe, cloth-bound volume at $2.50. The content of both is identical. All royalties accruing from the sale of the two editions will go to the Army Air Forces Aid Society, which holds the copyright. The pocket edition was published by special arrangement with Pocket Books, Inc., the cloth-bound edition by special arrangement with Simon and Schuster. The Official Guide will be available at Post Exchanges, both domestic and overseas, and everywhere in the United States that books and magazines are sold.

In both editions, the Guide contains 388 pages, including four pages of full color, and 64 pages of rotogravure pictures selected from more than 5,000 official photographs. The text is illustrated with more than 175 charts, diagrams and maps prepared especially for the Guide. AAF officers, enlisted men and civilians collaborated in the researching, writing, illustrating and designing of the book.

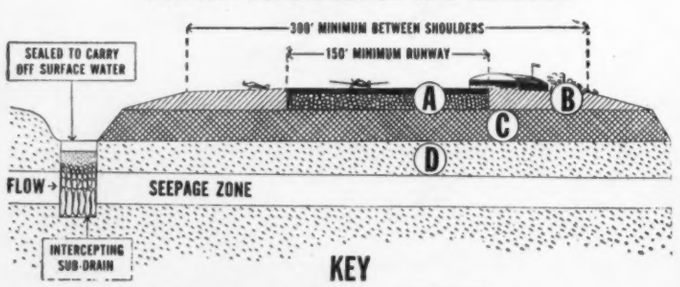
General Arnold states in his foreword to the volume: "This book is a useful, accurate guide to our operations, and should be of wide personal interest to those who know the AAF through relatives and friends in the service. It will be especially valuable to those who hope to become directly associated with us. To officers, men and women of the AAF it should serve as a helpful work of reference."

THE Guide takes up, in sequence, the AAF in its many aspects — the challenge of war, the air war plan, organization, personnel, training, equipment, supply and maintenance, airbases, combat tactics and techniques, combat operations, the records of the combat air forces, unit citations, individual achievements. It includes what is perhaps the most complete chronological report ever published on U. S. military aviation, from the Civil War to the early months of 1944. Its coverage regarding AAF planes includes the B-29, P-61 and identification of the 56 instruments on the panel of a heavy bomber. The extent of the information presented in this book is indicated by the size of the index which contains approxi-

AIR TRANSPORT CARGOES AND DISTANCES



RUNWAY CONSTRUCTION AND DRAINAGE



KEY

(A) PAVEMENT COMPOSED OF SURFACE BASE

(B) SHOULDER: COMPACTED SELECT MATERIAL

(C) STABILIZED SUBGRADE IN 9" COURSES

(D) FOUNDATION OF NATURAL SOIL, GRADED & COMPACTED

NOT DRAWN TO SCALE

mately 10,000 references. Chapter headings in the Official Guide, with brief summaries of the information contained in each chapter, are as follows:

On Target: An Introduction to the AAF

The challenge with which the AAF was confronted on December 7, 1941; the resources we had to meet the challenge; our plan for air war; the building of the AAF; the AAF in action today.

What We Are

Brief outline of the AAF from its beginning as a branch of the Signal Corps in 1907; the membership and functions of the air staff, the commands, continental air forces and other AAF agencies; the organization of an air force, starting with aircrew, group, wing and division; how squadron, group, wing and division; how an air force is organized for combat; the duties of commanding and staff officers; the inspection system — administrative, technical and tactical; the place of the AAF in the total war plans of the Army; teamwork and combined operations.

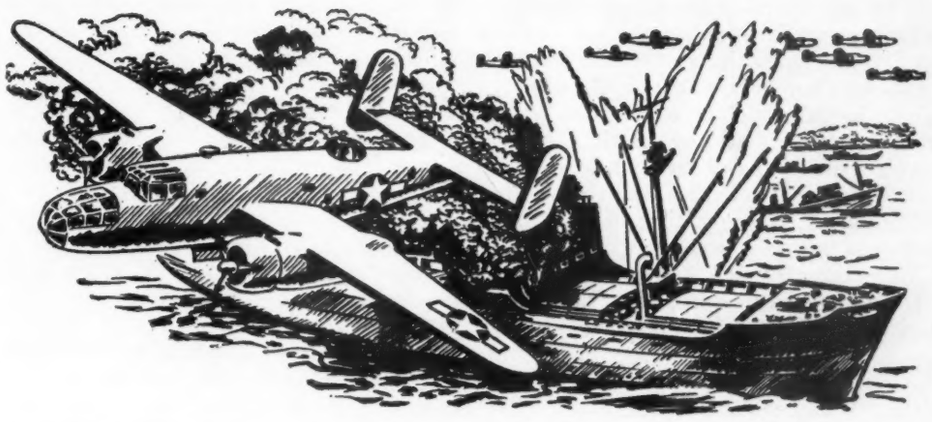
Who We Are

Personnel expansion; how personnel are procured, replaced and rotated; the Aviation Cadet Recruitment Program—physical and educational requirements and recommended courses of study for those who want to enter; a breakdown of military specialties, giving duties of each specialty for both officers and enlisted men; aeronautical ratings and requisites for obtaining them; aircrew wings and who may wear them; pay and insignia of officers and enlisted men; dependency allowances; duties of chaplains, special service and personal affairs officers; how personnel are brought back from overseas and redistributed; the AAF hospital program; recruitment, training and duties of Air Wacs, nurses and Wasps; the part played by civilians in the AAF; volunteer organizations — Ground Observer Corps, Aircraft Warning Corps, National Association of AAF Women, Army Air Forces Aid Society.

How We Train

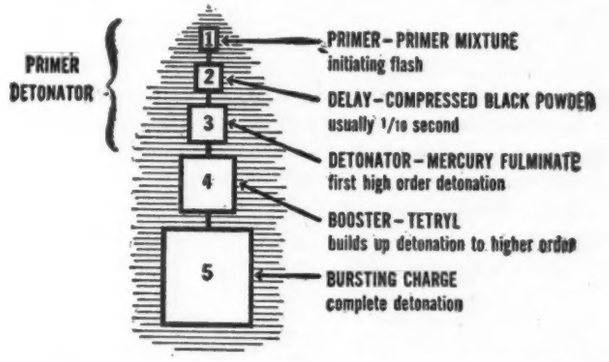
The growth of the training program; courses taught to pilots, bombardiers, navigators, glider pilots, radar observers, aerial gunners and non-flying AAF specialists, both officers and enlisted men; the welding of individual trainees into

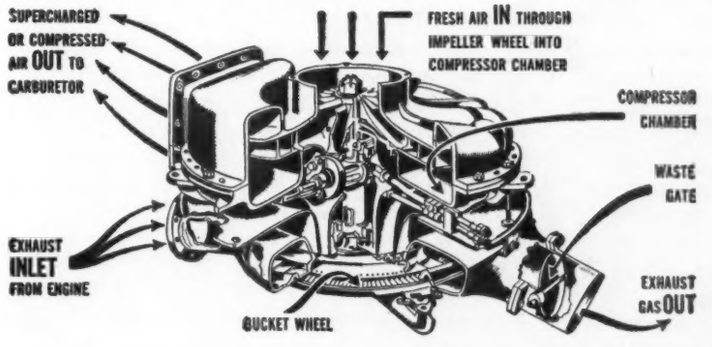
The illustrations on these pages are a few of the hundreds of drawings found in the text of the Official Guide. In addition, the Guide contains three rotogravure sections, with 64 pages of photographs of AAF leaders, men, airplanes and combat operations.



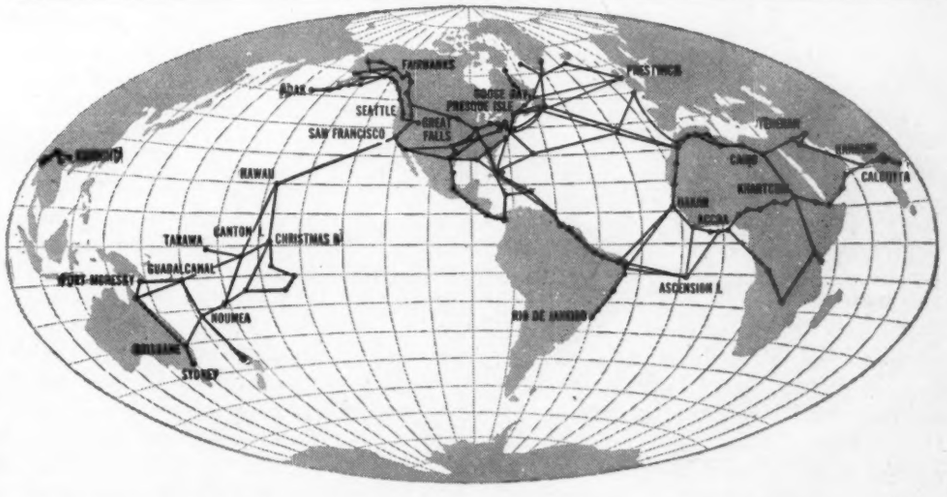
EXPLOSIVE TRAIN OF GENERAL PURPOSE (DEMOLITION) BOMBS

IN GENERAL, THE EXPLOSIVES IN THE SYSTEM ARE ARRANGED IN ORDER OF SENSITIVITY, FROM A SMALL QUANTITY OF A SENSITIVE EXPLOSIVE TO A LARGE QUANTITY OF LESS SENSITIVE EXPLOSIVE




SUPERCHARGED OR COMPRESSED AIR OUT TO CARBURETOR
FRESH AIR IN THROUGH IMPELLER WHEEL INTO COMPRESSOR CHAMBER
COMPRESSOR CHAMBER
WASTE GATE
EXHAUST INLET FROM ENGINE
EXHAUST GAS OUT
BUCKET WHEEL

TURBO-SUPERCHARGER



AAF COMMUNICATION ROUTES OVER WHICH AIR TRANSPORT COMMAND OPERATES

crews and units—fighter, bombardment, reconnaissance, troop carrier, air transport and service; the preparation of units and crews for combat; the final polishing given to personnel in overseas theatres; courses taught at the AAF Tactical Center; the School of Aviation Medicine; the School of Air Evacuation; courses for staff officers; training air and sea crews for emergency rescue work; hospital courses taken by sick and wounded; the training of instructors; students from foreign nations training in the U. S.; types and uses of training aids; the AAF's part in the High School Victory Corps and Civil Air Patrol cadet programs; how training accidents are kept at a minimum.

What We Fight With

The production and procurement of planes; the meaning of aircraft designations such as A, B, P, C, X, Y, Z, etc.; a comprehensive table of aircraft in use by the AAF, giving manufacturer, designation and name of each; prices of AAF planes; a chart of performance and characteristics of thirty AAF aircraft, giving engine type, dimensions, speed, weight and operational ceiling; how planes are tailored for combat; helicopters and gliders; airframes, airfoils, cabins, flaps, landing gear, tires, engines, propellers; jet propulsion; how the supercharger works; aviation fuels and fuel tank construction; electrical and hydraulic systems; types and operation of fixed and flexible guns; turrets; aerial cannon; ammunition for cannon and machine guns; types, sizes and purposes of bombs; bomb racks and release mechanisms; how flight and navigation instruments are used; the automatic pilot; how we employ electronics; types and construction of parachutes for personnel and supply; oxygen equipment for high altitude operation; aerial photography equipment; Wright Field, where new equipment is developed for combat; Eglin Field, where the equipment is proved under combat conditions.

How We Keep 'Em Flying

The units responsible for supply, transport and maintenance; the four types of supply—planes, aircraft parts, consumable aircraft supplies (gas, bombs, ammunition), material procured by Army Service Forces for everyday needs (food, clothing, building material); the domestic and overseas air depot system; transportation of supplies by ship; the value of air transportation; the problems involved in moving an AAF unit; procedure for overseas movement; transportation within the theatre of operation; the amount of transport needed to keep a combat unit in operation; ferrying aircraft; functions and routes of the Air Transport Command; operations of the Troop Carrier Command; problems of aircraft maintenance; the four echelons of maintenance; preventive inspection; standardization of maintenance procedures; reclamation and salvage.

What We Fight From

The importance of airbases; construction of an offensive base — runways, aprons, hardstands, revetments; storage, maintenance and control facilities; active defensive measures (fighter planes, aircraft warning systems, antiaircraft, etc.) and passive defenses (camouflage, dispersal, shelters, barrage balloons, etc.); definitions of types of installations—landing strip, airbase, satellite field, subbase, airbase area, AAF airways station; the expansion of our airbase system from 69 to 1,400 bases; the battle for forward bases, illustrated by the Solomons-New Guinea campaign; how a site is chosen and a new airbase is built; the specifications for bomber bases; landing mats; camouflaging a base; facts and figures about AAF bases in all theatres; organization, function, methods and achievements of the Aviation Engineers; a day at a typical combat base in Britain.

Our Battlefield

The natural hazards of the air—wind, fog, rain, snow, turbulence, cold, clouds; warnings and navigational aids transmitted by the Army Airways Communications System; mission and operation of the Weather Service; what hoppens to the human body in flight—anoxia, aeroembolism, freezing, defective vision, excess intestinal gas, flying fatigue; aviation medicine in the AAF and how it overcomes the physiological dangers of flight; methods of bailing out; procedures for ditching; emergency ditching equipment; how crews are trained and equipped to survive after forced landings in desert, jungle or tropics.

Our Air Forces in Action

The difference between strategic and tactical operations and the employment of each; classification of bombers; bombing altitudes; what determines the size of a bombing force; bombing formations and their components; how the bombsight operates; area, low level and overcast bombing; how bombers defend themselves; uses of medium, light and fighter bombers; fighter tactics and formations; how fighters engage the enemy; methods of fighter escort; fighter sweeps and intruder raids; ground control of fighters; radar detection of approaching aircraft; interception of attacking enemy planes; the employment of airborne troops; mission and operation of reconnaissance aviation; navigating by pilotage, dead reckoning, celestial fixes and radio aids; briefing and interrogating aircrews; photo interpretation; interphone, plane-to-plane and air-ground communications; the science of aerial gunnery; the combat air forces—summaries of the war records of the eleven overseas air forces and the Antilles Air Command and Antisubmarine Command, including the number of sorties flown, tons of bombs dropped, enemy planes destroyed and AAF planes lost.

Our Leaders

Pictures and brief biographies of some AAF personalities holding key assignments.

Awards and Insignia

Qualifications for Medal of Honor, Distinguished Service Cross, Silver Star, Distinguished Flying Cross, Soldiers Medal, Air Medal, Purple Heart, Bronze Star, Distinguished Service Medal, Legion of Merit, American Defense Medal, Good Conduct Medal, theatre campaign medals; origins and descriptions of AAF squadron insignia.

Battle Honors

Achievements of the following cited AAF units: 5th Interceptor Command, 19th Bombardment Group, 17th Pursuit Squadron, 7th Bombardment Group, 49th Fighter Group, 435th Bombardment Squadron, 11th Bombardment Group (Heavy), 374th Troop Carrier Group, 44th, 93rd, 98th, 376th and 389th Bombardment Groups (Heavy), 480th Antisubmarine Group, and the India-China Wing of the Air Transport Command.

Medal of Honor

Stories of the exploits which won the nation's highest award for seventeen AAF officers and men.

War Calendar

Two hundred and nineteen significant dates and events in the AAF's war record since Pearl Harbor.

Historical Highlights

A brief history of the growth of the AAF from its inception as a part of the Signal Corps in 1907 to its present position as the world's mightiest air force; a chronology of United States military aviation from the Civil War to Pearl Harbor, containing more than 375 separate entries.

Appendix

A bibliography of nearly 200 books and magazines about the AAF, the history of aviation, lives of flying personalities, theory of air war, military airplanes, air narratives of World War II, principles of flight, pilot training, technical handbooks, mechanics and engines, model airplanes and all other aspects of aviation; short glossaries of common air force abbreviations and vernacular.

Index

One thousand eight hundred entries and almost 10,000 references. ☆

BATTLEGROUND OF THE AIR

"COELUM AD PROELIUM ELIGE."

Under this banner, literally translated "Choose the Weather for Action," the Army Air Forces Weather Service is operating on the far-flung battle lines of the world. Weather has always been a factor in military operations, but never before has the science of weather been as important as in World War II.

Weather is a primary factor in determining the battleground of air warfare. It, too, is a weapon which must be weighed along with men and planes, ships and tanks, guns and supplies. To meet this demand thousands of young men have been trained in order that the Army Air Forces and our Army may have the best possible weather information.

From Alaska to Australia, from Greenland to Guadalcanal, the weather service is in the front line. The first world-wide weather service in history, it was born of military necessity. Its reporting and forecasting stations are strung from the frozen wastes of the north to the jungles of the south Pacific. Today they are a military necessity; tomorrow these outposts will be landmarks in the air travel anticipated in the post-war world.

Weather information is of value in inverse ratio to its age. At all events it must be up to the minute. It is of greatest value to our flyers when it is fresh off the ticker or radio receiver, less valuable the older it gets.

Weather, therefore, must always be in the front line, be it in North Africa or Italy, the CBI theatre, the South Pacific or continental Europe, wherever our forces fight or are poised for fight. Weather men set up their stations alongside advance air strips, whether captured or constructed; they are with the first wave that storms ashore.

Front line action means casualties and the weather service has had its share.

The men of this service have never forgotten the fifteen weather men who made the last ditch stand on Bataan and Corregidor. They look forward to the day when this region will again be active and will send an advance detachment to open a weather station atop the Emperor's palace in Tokyo.

On succeeding pages, AIR FORCE presents the story of the AAF Weather Service to afford personnel of the Army Air Forces a more complete understanding of the importance of this service to the successful prosecution of both air and ground operations.

BATTLEGROUND OF THE AIR

WEATHER IN YOUR HAT

By Capt. Luther Davis

AIR FORCE OVERSEAS STAFF

A BLINDLY zealous reporter stormed Supreme Headquarters in London, cornered a Major General and pleaded, "Sir, just give me a hint. When is the invasion going to start?"

"Well," said the General, "Someday a weather corporal out in the woods will stick a wet finger into the wind, think a minute and then tap on his teletype, 'Eisenhower, you may proceed.' Why don't you find the corporal and ask him?"

Not only will D-day and H-hour be set by meteorological experts, but the succession of aerial, amphibious and airborne operations which logically follow will not take place until Supreme Headquarters consults the staff weather officer.

Responsible for observing and forecasting weather for the 9th Air Force, which will provide tactical support to our invading troops, is a very special weather squadron. This fog-conscious organization will also do the forecasting for our Ground Forces as soon as they land in Europe.

To do their job our weather units must be very mobile. The first and most important aid in this regard is the K-53 Mobile Meteorological Station which is a van mounted on a two-and-a-half ton, six-by-six truck. In it are crammed gadgets for making hydrogen and sending up balloons, drafting tables, teletype machines, barometers, blue pencils, red pencils and even green pencils. When open for business, the whole establishment is topped by an old-fashioned weather vane not unlike the one on your grandfather's silo.

The K-53 is the result of a lot of thought and experience gathered by the weather boys who helped chase Rommel across Africa. They have it in the Mediterranean theatre now and swear by it—as do the men in the U.K. who expect to ride it to a lot of interesting places.

With every K-53 will be a communications truck carrying two standard radio receivers and transmitters, plus an electric generator to run them. These two large trucks plus two personnel carriers and a jeep will take care of a detachment of about 24 men of whom half will be "Met" personnel and half from a certain mobile communications squadron which was activated, staged and shipped along with the 9th Air Force's weather squadron. The two function in closest coordination.

Plans call for one of these free-wheeling detachments with every operating group of 9th Air Force planes, while higher headquarters—including Ground Force Armies and Corps—will have slightly augmented staffs and extra equipment.

In case we need weather observation ahead of sectors where trucks can roll, the job will be done by similar personnel with "package sets," which are complete weather observing and forecasting stations designed to be broken down into eight easily transportable units, no unit weighing over 200 pounds.

These fit neatly into a C-47 and unload with amazing speed. In actual field tests in England one of these package sets, plus its related packages of radio equipment, was unloaded and in operation forty minutes after the wheels of the transport touched the ground.

Although no one can guarantee that we will have good weather for our European tour, we surely will have enough warning to don our rubbers in time.

Things are cozy and rather academic inside the mobile weather station, but it's likely to be rugged outside. Helmets are in order.

K-53 Mobile Meteorological Stations like this move with invasion troops, carrying weather personnel attached to the 9th Air Force. As camouflage experts the weather men rate high. What you see at right below is a camouflaged weather station capable of operating 24 hours a day.

With atmospheric enemies which can be just as deadly as opposing planes and anti-aircraft fire, the airman needs to know what to expect from fog, storms, icing and headwinds. These weather men follow the pilot balloon with a theodolite to learn the speed and direction of wind aloft.

ATMOSPHERIC TERRAIN

EVERY battle in the air is fought on the shifting terrain of the atmosphere. This battleground of winds, clouds, rain and blue skies must be mapped by the AAF Weather Service as carefully as the surface of the earth is mapped for Ground Forces operations.

What a nightmare would confront the general on the ground if the mountains he had charted so painstakingly suddenly changed in height by thousands of feet, if the plains on which his troops were maneuvering started to go up and down like elevators, and the rivers his army expected to cross began to alter course, dry up or flood, all with disconcerting speed.

Yet these are problems faced by the air commander, by every pilot and navigator.

To the end of employing "atmospheric terrain" to the greatest tactical and strategical advantage, the AAF Weather Service operates like the block signal system of a railroad. The service's green and red lights flash on all over the world. Sometimes military exigency dictates air operations when weather is unfavorable. In those cases the weather service merely advises flyers what they may expect.

A mountain the infantryman has to scale has been there from time immemorial, the product of a plowing glacier or mighty upheaval of the earth. The mountainous clouds with which the airman must contend or in which he must seek refuge often start building up and rolling a thousand miles away from the scene of battle only a day or so before. Movements of the weather, like this war itself, are world-wide in dimension.

That explains the vital importance of Allied control in Spitzbergen, Iceland and Greenland. Our outposts in these lands give us knowledge ahead of time of the approach of bad or good weather for the European theatre. By the same token, one of the principal reasons for booting the Japs off Attu was to establish a weather station there. Many of the storms that hit North America are brewed in the Aleutians and move eastward.

THE general circulation of the world's atmosphere does not take place in small eddies and gusts, but in great, deep, broad rivers of air, far deeper and broader than the Gulf Stream or the Japanese current in the oceans. Air currents, too, flow far more rapidly than water currents.

A stream of cold, polar air starting southward from Hudson's Bay today may be over Chicago tomorrow, and the next day pouring countless cubic square miles of cold Canadian air over the southeast coastline. This great mass of cold air transported from the region where it acquired its low temperature will be denser and heavier than the warm, moist air moving up from the Caribbean. So the cold air sinks while the warm air rises and flows over it. Then, as the warm air rises, it expands and cools, causing the moisture it carries to condense into clouds, rain, snow and other phenomena.

Conditions along the edge of such a cold front are not favorable for air battle. Advancing at a speed of from thirty to fifty miles an hour, rivers of water are cascading down along the forward rim of the front. Thunderstorms form suddenly, dissipate as suddenly. Air operations must be conducted so as to dodge or take advantage of this squall line.

Time and again, our bombers enroute to and returning from Nazi industrial targets have used cloud cover for protection from enemy fighters and flak.

Our meteorologists hold no claims to infallibility in their predictions and Allied air operations have sometimes suffered from forecasts going sour—as have the enemy's activities at times.

Certainly none of the contesting powers has suffered such disastrous results from a forecast going sour as have the Japs on two notable occasions.

For one, the Jap armada of aircraft carriers and warships crept toward Midway and Hawaii under cover of a bad weather front. When they approached to within striking distance, the clouds began to dissipate, American airmen gave them a terrific hammering and the surviving remnants of the fleet beat a hasty retreat for home waters.

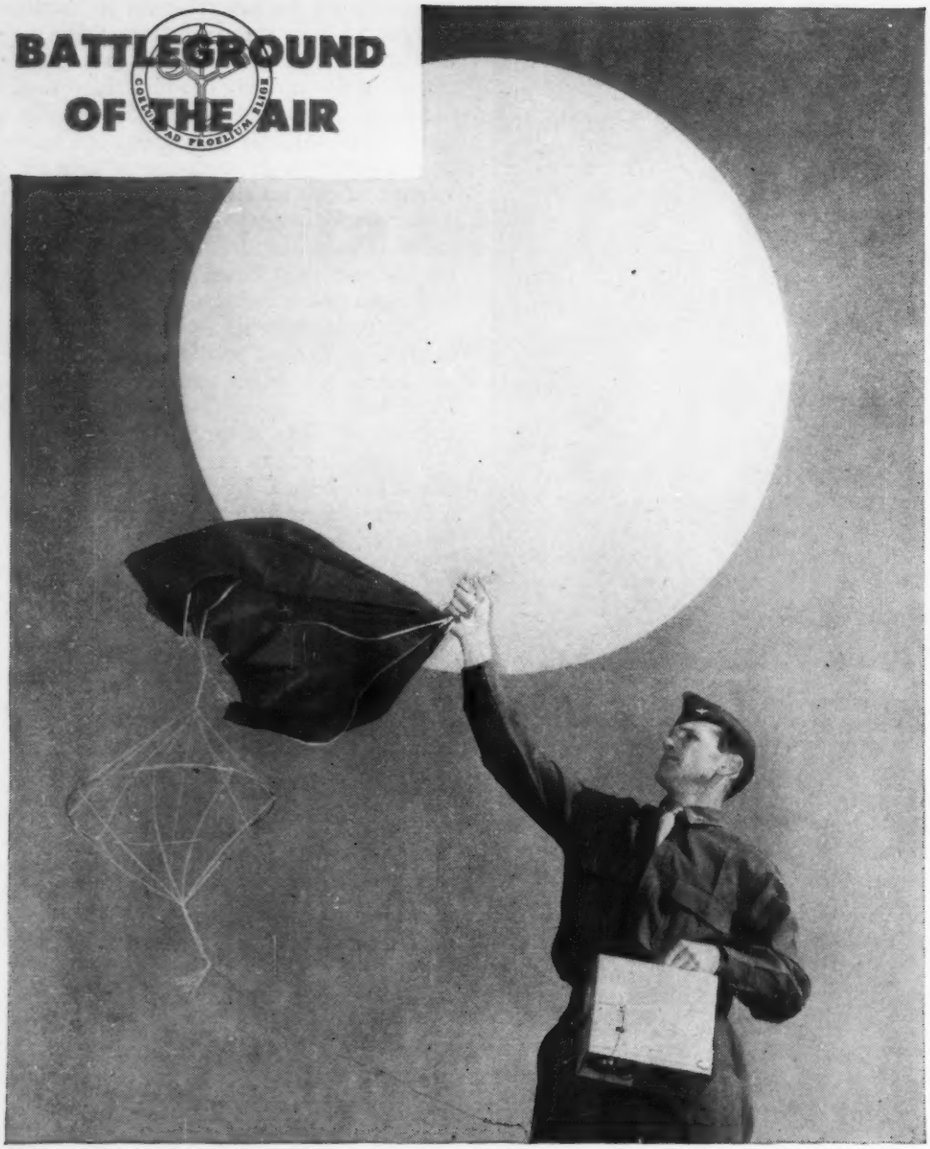
Once again a Jap fleet sallied forth. This time 22 warships and cargo vessels sailed for New Guinea across the Bismarck Sea behind a curtain of advancing rainstorms, clouds and fog. What was to all appearances a well-behaved front suddenly veered off in an unexpected direction. The weather cleared, leaving the enemy ships exposed like sitting ducks on a pond. AAF bombers sank virtually all of them, and thousands of Jap soldiers and sailors were drowned.

Mapping the aerial battleground begins as soon as air operations start from the field captured from the enemy or built by our own fighters. This must be done for the most efficient use of bombers and fighters. When a flight of bombers is forced to turn back because weather has socked in over a target, there is a costly waste in machines, fuel, jettisoned loads and sometimes in the lives of men.

The air commanding officer must have a new map of his battleground every time he starts out on a new undertaking. He must know what his battleground will be—not as of the time when the planes take off, but as it will be when they arrive at the scene of battle. It is not a problem of preparing accurate weather reports so much as a problem of making accurate forecasts from the reports.

Enemy planes and anti-aircraft are not the only foes of the airman. He has the constant threat of fog, turbulence, icing and headwinds. Weather has taken a greater toll of ships and men on some aerial missions in this war than the enemy. It is the job of the weather man to forewarn the pilot where lethal weather elements are lurking in ambush.

BATTLEGROUND OF THE AIR



The small package held by this cadet is a radiosonde, a miniature radio broadcasting and weather station which is sent aloft by hydrogen balloon to record and transmit information on temperature, atmospheric pressure and humidity. At 30,000 feet it descends by parachute.

THE AAF WEATHER SERVICE

By Col. W. O. Senter

COMMANDING OFFICER, AAF WEATHER WING

WHEN war broke out in Europe in the fall of 1939, the AAF Weather Service was a mere infant—and not a very lusty one at that. But the scant handful of officers and enlisted men in service at that time has since been increased by 9,000 percent.

Today the AAF Weather Service stretches around the world, operating wherever you find American troops and planes, and in a great number of lonely outposts where you find little more than polar bears or tropical fish.

Four years ago, the AAF weather service had no radiosonde, the gadget with which the meteorologist measures the temperature, humidity and pressure of the upper air masses, and obtains invaluable data with which to check his forecasts. Now our weather stations are sampling the air above the overcast or cloud deck with the radiosonde in a number of places, the bulk of them strategic points in theatres of operations.

On July 1, 1937, the Air Corps took over from the Signal Corps the responsibility of furnishing a meteorological service for the air arm and for weather forecasts required by divisions and higher headquarters. The Chief Signal Officer continued to have the job of developing, procuring, storing and issuing meteorological equipment.

One of the first moves of the Air Weather Service was to divide topographical United States into a patchwork quilt according to land and water masses. Each patch constitutes a weather region, manned by a squadron and regional control organization.

Later the global map was given the same treatment and today throughout the world there are more than twenty such organizations, including air weather reconnaissance squadrons and mobile weather units. Within each region there is a number of weather stations which exchange information with each other and carry on forecasting for aircraft units in the vicinity.

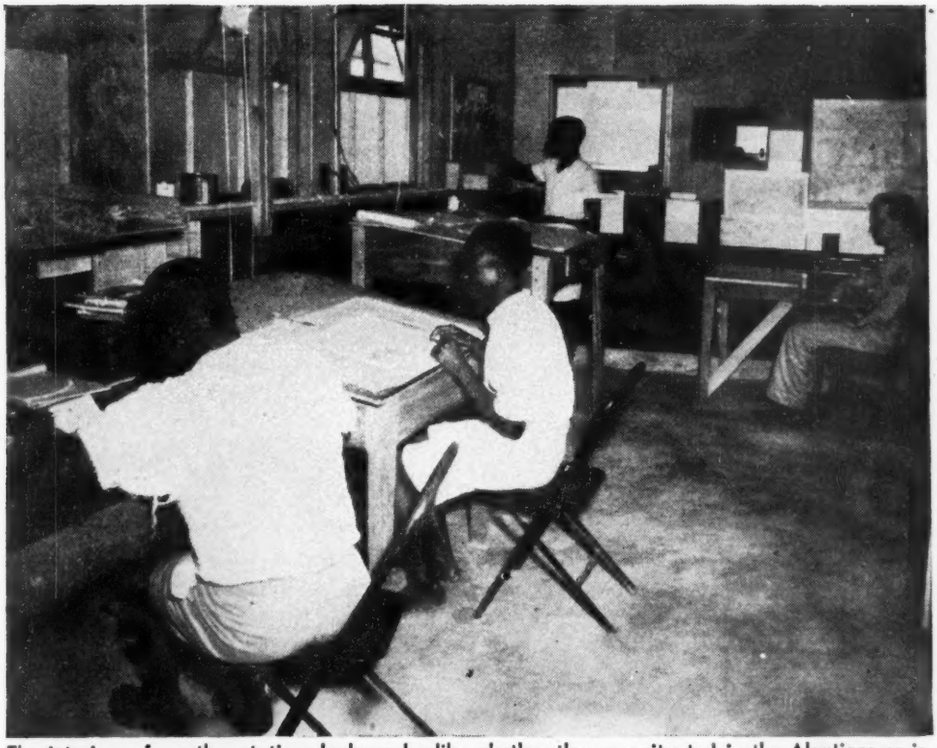
In addition to the officers in charge of the fixed and mobile stations, there are staff weather officers with theatre commanders and with various aircraft groups. The latter obtain information from the stations, then advise the commanding officers of their tactical units on the most efficient use of the weather elements.

WHEN the AAF first began to spread its wings over the world, the demand for weather officers was serious, in many instances acute. Even as late as October, 1942, there was a pressing need for weather officers in the headquarters of each bomber, interceptor, air support and air service command.

The weather service was fortunate in being able to obtain as commissioned officers several experienced meteorologists, who had been employed by commercial airlines and the U. S. Weather Bureau. But the number of trained scientists and specialists in the field of meteorology was definitely limited.

To help fill the need for competent personnel, a weather cadet program was set up under the direction of the AAF Technical Training Command, which arranged

Operating this theodolite is Sgt. Doris Williams, then corporal, who was in North Africa with the WAAC and reenlisted when it became the WAC.



The interiors of weather stations look much alike whether they are situated in the Aleutians or in steaming jungle growth. Natives of lands around the world have been taught to assist the weather men under military supervision. Here African natives are at work over their charts.

with several colleges and universities to offer an eight-month graduate course in meteorology. When it was determined that a lack of qualified prospects existed for this course, many cadets were given six months' preliminary training to bring them up to graduate level. The educational program continued for two years before enough weather officers were obtained to meet the demands of the fast-growing AAF.

Meanwhile, thousands of enlisted men, drawn from all walks of life, were sent to AAF technical schools where they learned in concentrated doses all about the theodolite, barometer, whirling psychrometer and other weather instruments. With additional training, some became forecasters.

Training now has leveled off, but the service is still expanding to meet new demands placed upon it. Lengthening of bombing range made possible by development of the B-29, requires weather forecasting over a wider area and, consequently, enlargement of the reporting station network. And as new fronts are opened, the AAF Weather Service will be required to extend its operations even further.

Administratively, the broad policies of the service are shaped by the Weather Division in Washington. Chief of the Division is Col. H. H. Bassett, who is also General Arnold's staff weather officer. In addition to advising the General Staff, the division supervises the weather requirements and information branches. The information branch makes long-range forecasts and prepares climatic data for use by Ground and Service Forces as well as the Air Forces.

The job of sending trained and fully equipped weather personnel overseas is handled by Weather Wing headquarters at Asheville, N. C. Wing headquarters also exercises command control over weather squadrons and regions in the continental United States and large areas bordering on the north and south. Squadrons outside direct wing control are governed by theatre commanders. However, the wing performs functions which indirectly influence methods abroad toward a more uniform and efficient service.

Weather Break

The AAF Weather Service in England hit the jackpot on popularity recently. Weather section of the bomber command had been working diligently to improve the accuracy of long-range forecasts. Culminating this effort was a correct forecast that the weather would be so lousy for three days that no type of bombing—not even through overcast—would be feasible. The commanding general of the bomber command gave the entire operational personnel a 72-hour pass.

Plane vs. Dog

Besides dishing out weather information for the Air Forces and other arms, there are times when the meteorologist himself has to wrestle with the elements. Take the establishment of a new station in Canada's sprawling northwest territory. A total of 12,300 pounds of supplies and equipment had to be moved from the nearest army post.

Consuming a month's time and making eleven landings, two Norsemen planes brought in 9,900 pounds and landed a weather man and radio operator to get out reports for future flights. But it was decided the weather was too much of a hazard. The remaining 2,400 pounds of equipment and personnel were transported by dogsled.

Definition

A meteorologist is a man who can look a girl in the eye and tell weather.

Lady and the Leopard

At one AAF weather station in Africa the appearance of a full grown leopard at the door causes no more commotion than a pilot who comes in to get a line on the weather. Raised from a cub by station personnel, the leopard is almost as tame as a kitten—thus far. Louise Rainer, the actress, visited the camp one day and was asked to enter the leopard's cage to pose for pictures.

"They did not tell me I had to do this when I left the States," she protested. But she obliged. The leopard seemed delighted.

Indian Weather

In India we use information supplied by the local weather service to supplement the reports furnished by our own weather stations set up in the far corners of the country. The art of weather observing in India is handed down from father to son.

Indian weather observers are all civil servants. They stay in their jobs which they do so precisely and well that their climatological data is among the most accurate in the world. Our forces leaned heavily on their findings in assessing the weather for the difficult task of flying and bombing the Jap during the monsoon season. Our flyers were able to bomb 27 out of 31 days in one month during the monsoon rains thanks to accurate weather information.

Weather on Wheels

Utility of those mobile weather units in the Mediterranean theatre is showing up in many ways. One of the stations on wheels was landed at Salerno and moved overland to Pomigliano airport near Naples. The radio communications unit was slid off the truck and placed on a concrete platform. The truck was then used for supply purposes. The radiosonde unit was also removed to make more room inside the truck for station operations. Another mechanized weather station near the front found its hydrogen inflation shelter unserviceable, used it as a latrine.

Advance weather information, supplied by the AAF to other arms and services, makes possible scheduled landings of materiel under favorable conditions. Much of this cargo piled on an Aleutians beach might have suffered great damage if put ashore during a rain storm.

SERVING OTHER ARMS

SINCE atmosphere is the medium for aircraft, development of a weather service was primarily the job of the Army Air Forces. However, other arms are using the forecasts of the AAF Weather Service on a mounting scale. This is especially true near the front lines where weather can make or break an operation.

Mindful of the universal use to which our world-wide weather service could be put, General Arnold some time ago directed that weather information be made available to other arms and services upon request.

Last winter along the mountainous Italian front, where snow, sleet, mud and murky skies slowed up the Allied offensive, the AAF Weather Service furnished forecasts to all corps of Lieut. Gen. Mark Clark's Fifth Army. Some prognostications were prepared a week in advance.

Mobile weather units, operating near the fighting lines, formed conclusions on the future course of the weather upon which the timing for two Fifth Army major offensives was based. The service also compiled climatological data on several months of the Italian winter before American forces moved northward from Naples.

When the Army fought its way to the banks of the swollen Volturno River, the Corps of Engineers turned to the AAF Weather Service. Its rainfall forecasts were taken into account in the design of bridges and the timing of their construction over the Italian stream.

In England, our weather service put together climatic data for certain sections of the British Isles on request of the Medical Corps.

Both climatic information and periodic forecasts of the service were used by the engineers in construction of the Alcan highway and other installations through Canada and the Yukon to Alaska.

On our own Pacific coast in recent months, the Quartermaster Corps has been obtaining minimum and maximum temperature forecasts from the AAF Weather Service. The information is used in planning the handling, transportation and warehousing of large stores of perishable foods and other Army supplies.

To the end of fostering closer liaison and determining weather needs of other branches, air weather officers have been assigned to the Infantry school at Fort Benning, the Field Artillery school at Fort Sill, to battalions and research projects of the Chemical Warfare Service and to the Signal Corps.

Nearly every day in Washington, the General Staff requests climatic information or long-range forecasts from the AAF Weather Information Branch. Such data is obtained by other arms in this country by channeling requests through the Military Intelligence Section of G-2.

CAVU AT PARAMUSHIRU

By Capt. Virgil E. Sandifer
WEATHER OFFICER WITH 4TH AIR FORCE

FORECASTING for any raid in the Aleutians neighborhood is a ticklish proposition. Weather fronts build up west of the Aleutians and move roughly eastward toward North America. So the meteorologist stands on the jumping-off place and tries to predict what's cooking in enemy waters without any reports from that area to go on.

From reports sent in by our own outposts in Alaska, the weather officer draws a surface synoptic weather map. He then studies the situation to decide whether any storms or squalls might come in and close the fields. Getting planes back in is always a problem in this part of the world. Finally, he sends out a meteorologist (often himself) in a plane to find the storm, to determine its limits and intensity. Periodically, he reports to the station where his findings are included on the current weather map.

Patrol planes also send back signals and, when they run into a particularly severe storm, radio its position. Pilots also size up the weather. It is important to know the flying possibilities of the weather because types that are flyable in some ships are unflyable in others. A weather man must constantly keep in mind the type of ships to be used on missions.

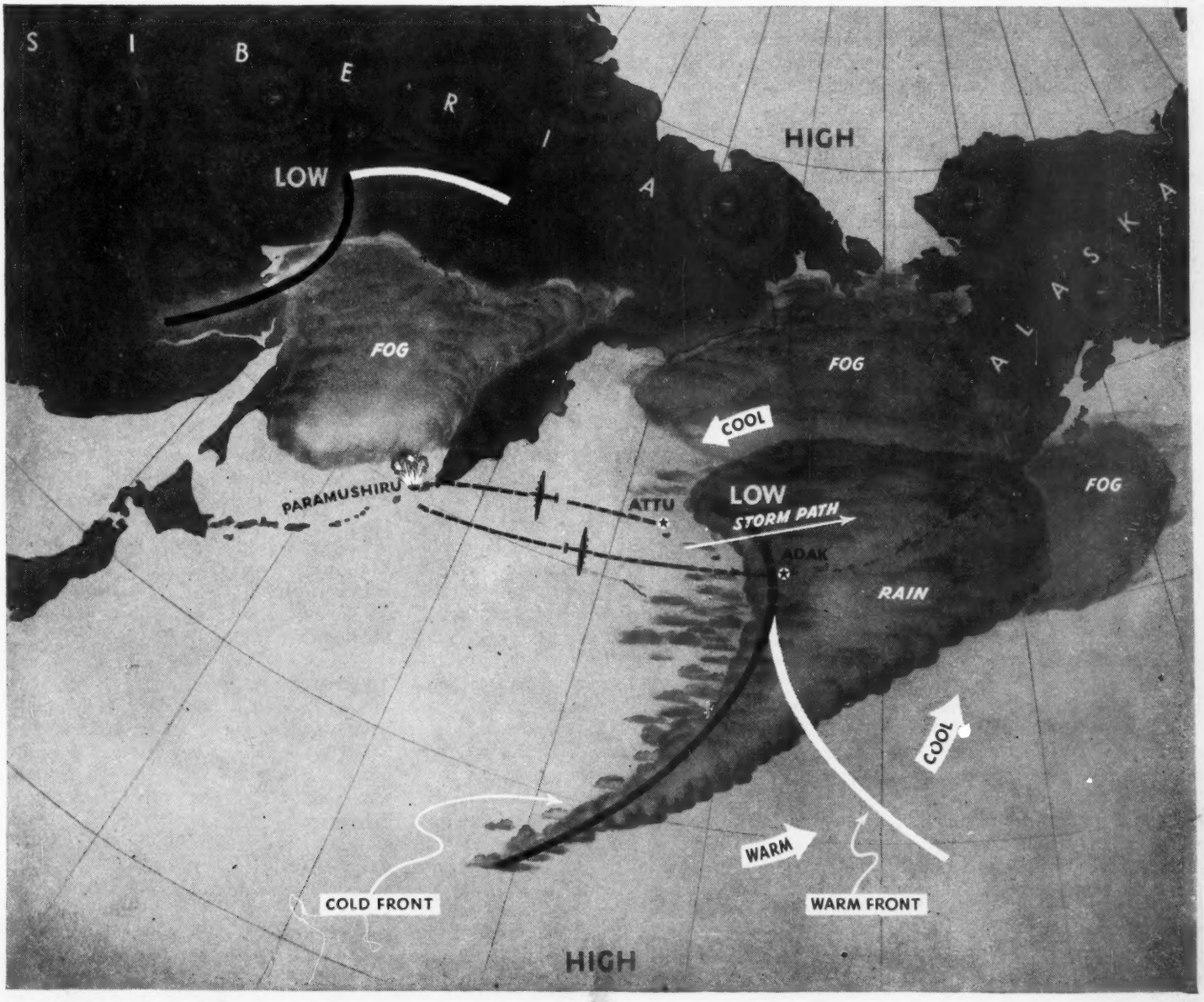
Much has been written about weather in the Aleutians. I don't know whether it's worse than in other theatres, but I can say you encounter as much bad weather in these islands in one year as you do in four years in the States.

Good weather prevails for only a few days in the spring and fewer days in the fall—when air and water temperatures coincide. Weather in the Aleutians builds up largely from the variation between these two temperatures. Fronts of bad weather may move through the Aleutians at 24-hour intervals, but they sometimes come as close as eight hours apart.

Weather's violence is caused by the cold air moving down from Siberia across the Bering Sea and hitting comparatively warm water. This warms the air and sets off squalls.

Now and then, these storms spread over an area as large as the United States. They tend to move into the Aleutians area and center themselves between Alaska and Dutch Harbor. There they remain for three days, spinning around with great gustiness and winds as high as 107 miles

Good weather days in the Aleutians prevail in limited number in the spring; they are even fewer in the fall. Incident to the first raid on Paramushiru, favorable weather followed passage of a well developed cyclone into the Bering Sea north of Adak Island. This storm brought down cool air from the north which momentarily cleared the summer fog from Adak and the air route between Attu and Paramushiru.



an hour. Precipitation consists generally of snow pellets. Flyers are warned to stay out of the clouds because of the turbulence and extreme icing conditions.

With the coming of summer, warm air from south Pacific latitudes will cool upon striking the cold water around the Aleutians and cause fog.

When word came that we were to raid Paramushiru, the Jap's Kurile Islands base, for the first time, other problems were simple compared to the complicated weather situation.

We had to have two terminals open for the planes when they returned, one at Attu and the other at Adak. In addition, Adak had to be open in the morning for the take-off. There could be no frontal bad weather between the bases and the target. The target had to be clear. Then, if possible, we wanted to have sheet-like stratus clouds over the Kurile Islands to furnish protection for the bombers since they would be without fighter escort.

I was working at headquarters with Capt. Archie M. Kahan, another weather officer. We sweated it out a week and a half for the right conditions. Meanwhile, all during that time the crews and planes were all set.

Each night, shortly after midnight, we would go in and wake up the commanding general, Maj. Gen. William O. Butler. He didn't mind it. In fact, most of the time he was waiting for us to get there with the maps. We didn't have to do more than put the maps down. He could read them as well as we could for the general had learned a lot about meteorology through practical experience. Later we would go over the reports. General Butler had to be absolutely certain that the conditions were right for this important mission.

FINALLY the day came. The weather looked good to us. It also looked good to the general. Messages went out to the bombers. That morning they took off.

I never wanted a crystal ball as much as I did that day. I didn't have one, so I did the only thing a weather man can do when he sends a mission out. I went to the top of the hill, where the weather shack stands, to sweat it out. It offered a fine view of the Bering Sea, the Pacific and all the runways. But that day all I was watching was the weather and, as the time lengthened, I began to listen for the sound of our planes.

At first, all I could hear was the radio station next to the weather shack and the chattering of the teletypes as they sent messages out to the various dispersal points on the island. The worst moments came when a couple of secondary fronts settled in at the Adak terminal. But eventually the weather broke and when the planes were due to return it was almost CAVU at Adak.

Paramushiru took a pasting and all our planes returned safely. I left the hill and the weather shack and didn't give a damn how the weather was for the rest of that night.

From such outposts as this little weather station, Army Air Forces meteorologists are able to observe and forecast the conditions which airmen will encounter on their missions against the enemy. From this weather station in India, Capt. John A. Hass prepared his forecasts for medium bomber strikes against targets in Burma. By briefing the pilots as to the best elevations for strong tail winds enroute to the target and light head winds on the way home, the bombers were able to make eleven sorties on the gasoline previously consumed in ten trips over the target. Such fuel saving is important in the CBI.

MAKIN'S WEATHER AND JAPS

By Lieut. Les Goldberg

WEATHER OFFICER, CENTRAL PACIFIC WEATHER REGION

WE landed before the battle was over. In fact, there were still 150 very live Japs cornered on the east end of Makin Island. Our artillery would shell them half the night. When our guns would stop, the Japs would come out and use their mortars and machine guns on us. Then their snipers would start sneaking all over the island. Some men got hit five miles behind the lines.

The weather equipment hadn't arrived so, feeling bored with nothing much to do, I joined one of the patrols which went Jap-hunting in the jungle. The patrols would look for Japs in the daytime and the Japs would look for patrols at night. In between times I pitched a pup tent and found some palm fronds for a bunk.

On the second day, I began to run into weather men. They had witnessed the naval shelling and landed right in the middle of the assault wave. After sweating it out for five days, we began to find our crates of instruments. We built our own furniture and set up the weather station temporarily in a pyramidal tent before erecting the permanent structure.

Our building was the first one completed, and we actually had the first installation on the island permanently established, moving in three weeks after arrival. It took some promoting and scrounging and plenty of hard work, but it was well worth the trouble.

Thanks to the cooperation of the colonel we were able to get the big things done with a minimum of red tape. We put 30 miles a day on a three-quarter-ton weapons carrier assigned to us. When we needed some glue, we were able to talk the Coast Guard into sending a landing boat out to a freighter lying in the lagoon so the sergeant could go aboard and obtain glue from the ship's carpenter. Everytime we passed a keg of nails without a guard on it, we refilled our nail box. The barometer was damaged moving over but there was a Signal Corps lieutenant on the island who was a meteorological instrument technician. He fixed it.

Soon we started forecasting. The first day after the planes landed, the colonel asked for a forecast for a strike on a Jap-held island in the area. I hadn't seen a synoptic weather map for two months but a cold front had gone by the day before, and, with that as a basis, I prepared the forecast aided by a pibal (pilot balloon run to determine direction and velocity of winds aloft), and hit it on the nose. We've made forecasts for more than thirty strikes over five islands and we haven't missed yet. You can't help bragging a bit when the breaks are that good.

I had a phone in my bomb shelter so

when Charlie came over, I could be reached directly by the colonel to give headquarters the best information we had on the weather so it could be decided whether to follow them back or not. We also have had to forecast for joint Army-Navy-Marine strikes on twenty minutes' notice.

To add to the sidelight statistics, we had been bombed 33 times when this was written. I nearly got mine one night when a 500-pounder landed about 100 feet from me while I was in my bunk. I can still hear the swish of that baby.

I AM reminded of an alarm we had at night recently. One of our latrines, which are built out over the lagoon, broke loose and floated away. Our detection devices picked it up and the whole damn place got called out to stop an invasion of enemy surface vessels. ☆

'MET' BOYS IN THE SOUTH PACIFIC

By Sgt. John Fitting, Jr.
SOUTH PACIFIC WEATHER REGION

THE AAF spirit of teamwork, famous in every combat theater, nowhere is better exemplified than in the South Pacific where cooperation of weather men and flyers often draws the line between success and failure of a mission and sometimes spells the difference between survival and death for the airmen.

In the broad expanse of tropical waters, dotted by insular stepping stones to Tokyo, the elements can be either a protecting friend or vicious foe of the men who fly. The job of the weather man is to permit use of Mother Nature's fickleness to advantage by the accurate prediction of her variable moods.

And her moods are extremely variable in the South Pacific. Pilots in this theatre must know before taking off on a mission precisely what atmospheric conditions they will encounter to, from and over their target. They must know where best flying levels are to be found, whether the target will be clearly visible and if cloud coverage will shelter their approach and provide them a haven after the bombing run.

Just as important as weather information that can be used to tactical advantage are warnings given flyers of impending danger in the form of tropical storms which are of sufficient fury to dash a plane and its crew to destruction.

In the South Pacific, AAF meteorologists have to employ plenty of ingenuity to overcome the natural advantage afforded Japanese forecasters by the earth's rotation, which causes weather normally to move from west to east.

While the Japanese with little effort can determine what sort of weather is heading toward our installations and operational areas, AAF meteorologists frequently fly far over enemy-held territory to obtain an accurate line on approaching conditions.

The AAF weather observer flies on a bombing mission one day to evaluate atmospheric conditions in their application to the next day's operations. Along the route he watches the gradual building of billowing cumulus. When he returns, he has data on amounts and types of cloud formations seen at various points.

Many of the flying observers are qualified gunners and when the occasion demands they can take over at a gun position. But if a weather man is lucky enough to knock down a Zero, the achievement is only incidental to his principal mission, for outguessing the weather is his chief concern.

EVERY AAF base in the South Pacific has its own weather station. Instrument readings on prevailing local conditions are combined with reports of the flying observers and radioed advices from other stations in the AAF's weather network.

The information at hand is plotted on large maps and charts which enable meteorologists to trace weather transition over a wide area and to analyze its portents. Often weather men work all night in order to have the forecasts ready at take-off time the next morning.

The men who study the elements are constantly on the alert to detect the presence of thunderheads, technically known as cumulonimbi. A manifestation of Nature in her ugliest mood, the thunderhead is one of the deadliest perils to flying in the South Pacific.

In that area, the thunderhead's anvil-shaped top may climb as high as 35,000 feet. Its danger lies in the steel-like strength of its vertical air currents, which attain a velocity of 125 miles an hour in their six-mile ascent.

Up-drafts conflict with down-drafts of equal velocity and a plane caught in the opposing streams can easily be ripped to pieces. Its wings can be torn off and its fuselage broken and scattered. So powerful are the currents that debris of a wrecked plane can be held aloft for as long as fifteen minutes.

These giants of destruction hover over many of the routes flown by the AAF in the South Pacific. They are found in unbroken lines hundreds of miles long in frontal zones which exist where two huge air masses of conflicting physical properties meet.

Should a pilot run into a particularly dangerous thunderhead, he and his crew and plane would have only the slimmest chance of survival. Fortunately, however, the weather men can foretell the position of the white parapets of the cumulonimbis. If they lie along the route of a proposed mission, the take-off normally is delayed until they clear away. But if the mission must be flown on schedule, the weather men can advise the pilots concerning an alternate route, by which the hazard can best be avoided.

The AAF Weather Service in the South Pacific also plays a big part in the rescue of flyers, forced to ditch at sea. Search planes are given data on winds and drift in the vicinity of the crash, and location of the survivors' life raft is thus facilitated.

The flyers are the boys who register the put-outs in the South Pacific but the weather men must be credited with plenty of assists. ☆

SCIENCE MOVES ON

You've heard about Col. F. A. Kluever's reliable rheumatic donkey which brayed whenever it was due to rain in his section of Africa. In New Caledonia the weather boys found a different answer, when their whirling psychrometer broke and they had to find a way of measuring relative humidity for the synoptic reports.

They strung a rope between two Gaiac trees. Whenever the rope tightened, they knew there was plenty of humidity. When it relaxed, the air was dry.

SOUTHWEST PACIFIC FORECASTS

A recent analysis conducted by a weather regional headquarters in the Southwest Pacific shows the tremendous volume of air traffic in that theatre which must be serviced with adequate weather information. The canvass brought out the fact that more than 35,000 forecasts were furnished during a six months' period for the safe conduct of aircraft in the theatre.

INDIAN AIR JITNEY

A C-47 used by the AAF Weather Service in India has been busier than a New York taxicab on New Year's eve. Over a period of more than four months, this aircraft has been flying on an average of five hours a day, carrying approximately 3,000-pound loads and six passengers on each trip.

Col. Richard E. Ellsworth, regional control officer, and his staff have used the plane to visit outlying weather stations. In addition entire station units—personnel, supplies and the instruments required for measuring the weather elements—have been hauled by the plane to outlying points in the mountains and jungle. ☆

ON THE ALERT!

CARTOONS BY JIM RAWLS

TIMELY ADVICE FROM THE AIR INSPECTOR

Administrative ★ Tactical ★ Technical

Matters presented here are informative only and are not to be considered as directives.

▸ ***How to Attain Old Age:*** Self-preservation is a basic instinct of man but, unless supported by practical knowledge, the instinct often is ineffectual. In order to determine just how well he can take care of himself, every soldier should give himself this quiz:

(1) Do I know how to use my individual weapon to the point where I have confidence in it?

(2) Am I familiar with defense tactics applicable to my assignment in the air or on the ground?

(3) Can I perform first aid on myself?

(4) Do I have a knowledge of means of survival if stranded in the area in which I am fighting or will be fighting?

(5) Do I know how to avoid diseases common to the area in which I am stationed?

(6) Do I know the ordinary rules of sanitation concerning mess utensils, latrines, etc.?

(7) Have I learned well the lessons of chemical warfare and is my gas mask ready for use?

(8) Do I heed safety rules or do I take unnecessary chances?

▸ ***Unnecessary Equipment:*** Overestimating supply needs is an error which can grow like a snowball rolling downhill. An overseas report calls attention to the dangers of supply personnel ordering equipment their units "might need . . . perhaps . . . someday." Depots in turn will multiply their requests, and shipment of needed items consequently may be held up because space is utilized by the unnecessary materiel.

Equipment, whether controlled or not, must be placed where it can do the most good. Frequent checks must be made to assure that there is no excess equipment on hand. Attention is invited to AAF Regs. 65-43 and 15-108, and TM 38-220.

▸ ***Accrued Leave:*** Many officers, warrant officers and flight officers apparently have not been properly instructed in maintaining a record of their accrued leave. Sec. I, WD Cir. 55, 1943, requires officers to certify the amount of their accrued leave and to maintain personal records necessary to prepare certificates. The information will not be furnished by the Office of the Adjutant General. A certificate will be required whenever an officer is relieved from active duty under circumstances entitling him to terminal leave. (Par. 2a, AAF Reg. 35-31, 5 April 1944.)

▸ ***Ordnance Reclamation:*** Shortage of critical materiel and need for ordnance equipment repair parts make it imperative that all AAF installations utilize to the fullest extent facilities available for reclamation of unserviceable ordnance equipment and assemblies. Prompt evacuation of assemblies, sub-assemblies, and other reclaimable items must be made to expedite reclamation by various service commands. Direct exchange of unserviceable items will be made to prevent backlogs or accumulation of ordnance property. Maximum service must be derived from all components and materiel before they are consigned to a salvage officer for scrap. (AAF Memo. 65-5, WD Cir. 7, 1944, AR 850-15, 28 August 1943, and Army Service Forces Cir. 140, 6 December 1943.)

▸ ***When Lights Are Low:*** Truck units are not fully trained for the job ahead if they cannot keep their vehicles rolling under blackout conditions. And there isn't always a nicely lined concrete highway to follow when drivers overseas are ordered to go easy on the lights. Tactical inspectors should check to be sure that this type of driving is given due attention in training.

▸ ***Personal Affairs:*** Every soldier going overseas should place his personal affairs in proper order before leaving his home station. Reports indicate that too many individuals, about to depart for overseas stations, arrive at staging areas without having completed arrangements for insurance, allotments of pay, maternity care for wives, family allowances and similar other matters. (Sec. 5, WD Cir. 134, 1944.)

▸ ***Troop Train Commander:*** When an officer is designated as commander of a troop train the first time, he usually starts scrambling to learn his duties. Few assignments allow so little time for preparation and training because troop movements are usually on short order. To assist officers, WD Pamphlet 20-7, Troop Training Commander's Guide, was published 14 March 1944. The introduction points out that "careful reading of the guide and appropriate regulations, plus a combination of good judgment and a sense of humor in performing his task, will insure for each train commander the successful accomplishment of his mission."

▸ *Maintenance Rivalry:* Rivalry between maintenance crews of various squadrons is an example of the American spirit that is helping get this war job done, but it should not be permitted to go too far. An overseas report points out that friendly competition may become dangerous.

Consider the case of structural damage to an airplane, due to enemy gun fire or other causes. The squadron maintenance crew, of course, wants to exhaust its own resources before turning a ship over to a service group.

Maintenance crews, however, are not equipped with facilities for proper and safe structural repair, and should release the plane to a service group. A "patched up" job, performed by the crew, may result in the plane's failure to return from its next mission.

▸ *"Switch It Off":* A small card carrying the reminder, "Switch It Off," will be posted soon near all electric light switches in Army installations (Conservation Program Project No. 13-E-2). Where used to date, the card has resulted in savings of from 5 to 12.9 percent in consumption of electric power, reports the Corps of Engineers. An average reduction of 7.5 percent in power use by all posts, camps and stations in the Zone of the Interior would bring a total annual saving of approximately 213,900,000 KWH or $2,438,460. It pays to "Switch It Off."

▸ *Defense Against Radio Jamming:* It is hard for a radio operator to avoid getting into a "jam" overseas, but the trick is knowing how to get out of it. Both the Nazis and Japs use jamming tactics against our radio circuits especially when they have something important brewing. WD Technical Bulletin Sig 5, "Defense Against Radio Jamming," contains many tips for radio operators in anti-jamming tactics.

▸ *Advice From a General:* "Much more emphasis must be placed on military courtesy, on dress, and on cleanliness. If a man is so lethargic that he fails to salute, he is so lethargic that he will fail to recognize an enemy. If he gets himself dirty, he loses self-respect. Discipline is based on obedience. The best way to insure obedience is from the bottom. If men salute properly, pay attention to their dress, wear the clothes ordered, they will carry out orders in battle. If they fail in these respects, they will be negligent in battle and will be killed to no effect." (Letter from a General Officer in Tunisia.)

▸ *Order of Importance:* "In order to insure that the utmost benefit is derived from inspection, it is necessary that inspection emphasis be placed, in order of importance, on those major factors affecting performance of the mission of a unit or activity and the efficiency and economy of its operations." (Par. 2b, AAF Reg. 120-1, 29 March 1944.)

▸ *Dental Treatment:* The phrase, "Let's get our teeth into this war," takes on a literal meaning in preparation for overseas movement. Par. 9b(6), POM, directs that "all necessary dental treatment, from a health and functional standpoint, will be provided troops prior to their departure from home station." This doesn't mean, however, that dental work should be put off until troops are alerted. Dental officers and inspectors must continually check records to insure that work is progressing satisfactorily and individuals must report promptly when defects develop. No one wants a toothache over Berlin. ☆

HERE ARE THE ANSWERS

Q. *Is it necessary for all AAF organizations to maintain a duty roster?*

A. No. Following approval by the War Department, Headquarters, AAF, delegated authority to major commanders, including station commanders, to dispense with maintenance of a duty roster in specific installations, organizations and detachments where it serves no useful purpose in effecting daily assignment of personnel to housekeeping details. (AAF Ltr. 35-37, 16 December 1943, Subject: "Maintenance of Duty Roster")

Q. *Is an overcoat included in the baggage limitation for personnel traveling outside the continental United States in AAF aircraft or aircraft operated for the AAF?*

A. One overcoat or raincoat, if worn, is not included in the baggage limitation. (WD Cir. 122, 1944)

Q. *Should an officer be barred from promotion because he has not served under one commander for a sufficient period of time?*

A. No. In accordance with existing regulations, Par. 5c, AR 605-12, it is only necessary that the commander originating the recommendation have knowledge of the manner in which the officer has performed duties considered commensurate with the higher grade. This information is available on the officer's record card, Form 66-2. (AAF Ltr. 35-76, Subject: "Overdue Promotions," 5 April 1944.)

Q. *May enlisted men wear the coat, mackinaw, while on furlough?*

A. Under current Tables of Equipment, enlisted personnel with certain occupational specialist designations are issued the coat, mackinaw, in lieu of the overcoat and are therefore authorized to wear the coat, mackinaw, while on pass or furlough. Except as provided above, the coat, mackinaw, is not authorized for wear on pass or furlough. (Sec. IV, WD Cir. 64, 1944.)

Q. *When traveling, is it permissible to pack the gas mask in the barrack bag?*

A. No. Packing of gas masks with other individual equipment in barrack bags on change of station has resulted in broken eyepieces, crushed canisters and torn carriers. Personnel will discontinue this practice immediately. The gas mask will be carried on the soldier's person. (Sec. I, WD Cir. 325, 1943.)

Q. *Will towels and toilet articles worn out through fair wear and tear normally be replaced by government issue?*

A. No. There is authorization, however, for replaceplacement issues of such articles when they are lost, destroyed or rendered unserviceable in combat or in other situations in which the enlisted man concerned is not at fault. (WD Cir. 121, 1944)

Q. *May an officer see all classified matter?*

A. No person is entitled to knowledge or possession of classified matter solely because of his grade or position. Classified material is entrusted only to individuals whose official duties require such knowledge or possession. (Par. 19, WD Cir. 91, 1944)

When the food bombardiers plaster a friendly airfield their aim must be accurate or supplies will fall out of reach of our men, or even into the hands of the enemy. At this location, airdrome construction crews are supplied with food packages dropped from a cargo aircraft.

FEEDING THE AAF

By Capt. Benjamin J. Grant, Jr.

AIR FORCE Staff

It takes 10,000,000 pounds of groceries a day for our big family's three squares.

AMERICAN ships carrying B rations began arriving at Oran on December 15, 1942. Working in a driving rain, Arab laborers passed the cartons hand to hand from shipside and piled them on the dock. Arabs work slowly. At least one ship was ten days in the unloading.

The inevitable happened. Rain-soaked cartons broke open and labels disappeared. The result was a fifty-foot heap of unassorted and unpredictable canned goods. A mess officer wanting beans was lucky not to get salmon or evaporated milk. But everybody was good-natured about it, because it was nobody's fault.

Harassing experiences like this of the 12th Air Force have been multiplied around the world, wherever AAF units have moved quickly into new places. Food for the AAF's ever-moving outfits has been hauled by camel pack, by mule, by native carrier, by barge and by airplane. It has been flown over the heads of the enemy and dropped, with or without parachutes, to isolated stations. It has taken all the ingenuity of air quartermasters to meet these situations.

Today, the AAF is feeding something like 10,000,000 pounds of food a day to a family of more than 2,000,000 men and women. The daily diet of AAF soldiers is 1,800,000 pounds of meat, 2,800,000 pounds of vegetables, 1,200,000 pounds of fruit and 2,000,000 pounds of dairy products, plus appropriate quantities of items such as soup, dessert, salad, coffee, tea and candy.

Spread these requirements around the world, to desert stations, to tiny Pacific islands, to Arctic weather stations, to jungle bases accessible only by air, allow for the quick movement of AAF units, add a generous portion of combat emergencies and the special problems of diet for flying personnel, and you begin to comprehend the extent of this task of feeding the AAF.

It is an interesting fact that the average AAF soldier eats five ounces less food per day than the average ground soldier. But in the AAF we consume an average of five pounds of GI food apiece every day, which should be enough to keep a fellow from going dangerously hungry.

To see that the AAF gets its three squares a day is one of the jobs of the Air Quartermaster, Col. H. R. W. Herwig. Operating under the Assistant Chief of Air Staff, Materiel, Maintenance and Distribution, he has the task of representing the AAF on all matters having to do with quartermaster supplies, personnel and equipment. This involves more than food. It also includes clothing and equipage, which themselves are very considerable orders.

To clarify the division of functions, the procurement of food and its transportation to railheads, ports or warehouses, here and overseas, are jobs of the Quartermaster General; from there on, feeding AAF personnel is the AAF's business. This includes the issuance of food to units or messes, preparation, serving and salvage disposal. It also includes finding the answers to special AAF problems and delivering food by air to isolated troops, ground as well as air.

SOME of the most daring missions of the war have been flown to isolated spots to drop food, and more than a few AAF airplanes have been shot down on such flights. Back in the early days—and even now, for that matter, for we still have much to learn about making deliveries under such conditions—beleaguered men found themselves on pretty thin rations. At Guadalcanal, some had to get along on monkey meat and onion sandwiches.

In many cases, the food "bombardiers" have been handicapped by a shortage of information about the target. The aim must be accurate or the food goes to waste —or worse, into enemy hands. Having

learned our lesson about overshooting the mark, our relief forces now try to place in each food-carrying airplane a man thoroughly familiar with the territory in which supplies are to be dropped.

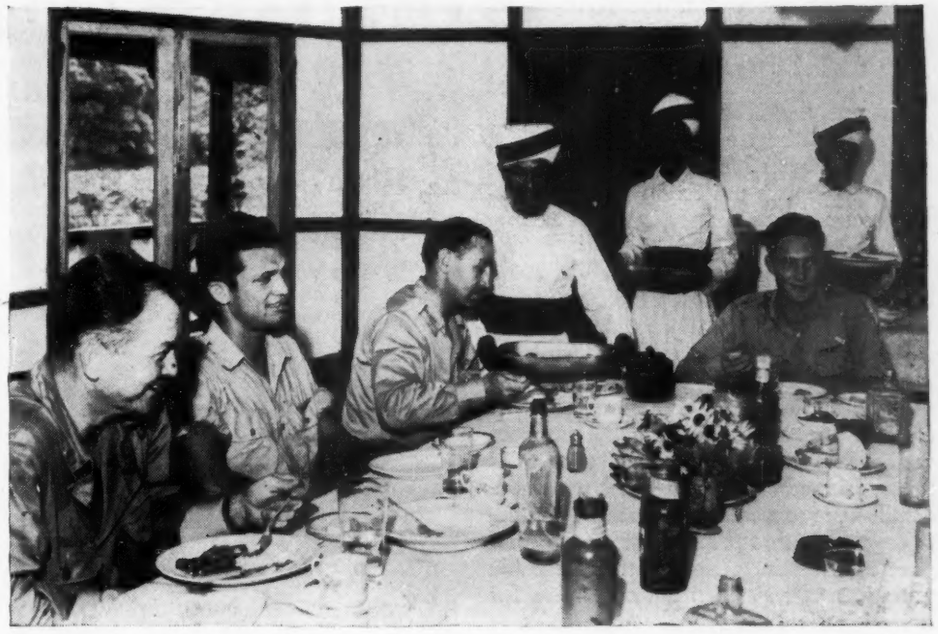
When the Japs captured Kokoda, some Australian troops were trapped in the Owen Stanley Mountains. U. S. airplanes, flying a perilous course, dropped rice to them day after day. At first, the bags burst when they hit the ground and much of the rice was lost. Then they tried using two bags, one inside the other, but they still burst open. Finally, they put on a third bag and, thus reinforced, the package held together. For all the difficulties, it was considered a successful operation.

In the New Georgia operation, our troops in pursuit of the enemy outdistanced the movement of supplies, which were transported slowly over almost impassable terrain. Supply by air became necessary. Many tons of supplies were dropped by parachute to field units.

In another case, it was necessary to drop food to U. S. troops in a New Guinea forward area, where the terrain made surface transportation arduous and slow. Most of the dropping points were at the bottoms of deep, narrow valleys where, in some instances, it was necessary to descend 2,000 feet, drop the supplies and climb steeply to get out. Many a ship returned with damaged ailerons and elevators.

Such experiences have led to the development of a new, streamlined ration, known to be palatable and believed to be as healthful and substantial as that now fed to AAF soldiers, but weighing only two and a half pounds. It consists of dehydrated, canned and processed foods, and is designed for use in the field in situations where the ten-in-one ration (a day's food for ten men) is not available. The new ration has undergone tests by the Air Forces Board at Orlando, Fla.

This is typical of current studies to improve the food of our fighting men, to adjust it to high altitude flying, to correct its packaging and to get the distribution system in line with war conditions.



The home of this fortunate fighter unit in the jungles of Assam was formerly the mansion of a manager employed by a British-India tea company. The men seem to be making out in reasonable comfort as compared to the usual housing of crude bamboo huts. They are served by India bearers.

At Salina, Kan., tests are being made of all the elements of AAF food, and some of the findings have been quite remarkable. Enough already has been done to establish pretty definitely that a man who flies at high altitudes is a special feeding problem. For example, it has been learned that at 18,000 feet, the volume of gas in the intestine is doubled, at 39,000 feet it is increased five times.

It has become recognized that fried or crusted foods, fibrous foods such as celery and cabbage, food of high fat content such as pork, and carbonated beverages cause distention of the intestine at altitudes above 20,000 feet. This results in pain similar to that caused by indigestion and effects the efficiency of the flyer.

The experiments at Salina concern preflight, in-flight and post-flight feeding. The findings likely will result in a number of modifications of the diet of flying personnel.

Experts working in cooperation with Colonel Herwig and his subsistence officer, Maj. E. W. Elliott, are making studies looking to the elimination of the sandwich-lunch system now in common use for long flights. The only alternative today—and this one is almost as undesirable—is to rig up the airplane for cooking. The answer probably will be food trays, one for each man, neatly stacked away and kept warm until meal time, like the arrangement now used by the commercial air lines except, of course, that on Army transports or bombers there will be no pretty hostesses to do the serving.

THE AAF has developed an aircrew snack lunch and has bought 10,000 of them for testing in the theatres. Designed to give the boys a lift on the trip home after combat, these neat pocket-size boxes contain:

(1) Chocolate, because the boys like it and because it gives them energy.

(2) Caramel, for the same reason.

(3) Chewing gum, because it absorbs nervous energy, keeps down thirst and reduces the liquid intake.

(4) Hard, bland candy, because a little of it goes a long way. A small piece of such candy is enough to last a man fifty miles or more. It serves also to release from the body tissues a considerable quantity of water which is not used in digesting the candy.

There are other AAF rations: the parachute ration, two in each parachute seat, consisting of high protein foods; the life raft ration, containing candy, chewing gum and vitamin tablets; the combat lunch ration, for use in airplanes equipped for cooking; the D ration, the same as the one issued to the rest of the Army but specially packaged for the AAF, and the K ration, modified for the AAF by the addition of citrus juice. *(Continued)*

Supply problems on Guadalcanal in the early days, particularly the handling of food for the first arrivals, were met by quartermaster personnel in the best possible way. These ground crew men of a fighter squadron line up for chow. Far better facilities are in use today.

All over the world, the AAF is engaged in on-the-job experimentation with methods of packing food for dropping to isolated troops. Aside from the standard containers, which are not always available, the most satisfactory packaging material so far discovered is sawdust, which has proved adequate protection for free-dropping canned goods and, if very carefully packed, bottled food.

Packaging for dropping, free or parachute, is done locally with whatever materials are available. Sometimes sawdust isn't, and substitutes include excelsior, rags, hay, straw and even paper. AAF units in Africa once complained that aircraft engines shipped to that theatre from the States were not as well packed as those shipped from Britain. When more details were requested on what was wanted, it developed that the interest of the complainants was in getting more salvageable packing materials to make containers for dropping food from airplanes.

Parachute food packages usually weigh 100 to 175 pounds. Free-drop units normally weigh forty to sixty pounds, although ninety-pound packages have been

At this desert training center men are taught to pack food and equipment which are dropped by parachute to troops in isolated sectors.

dropped with fair success. The normal food for dropping from airplanes is the C ration, packed in cases of eight rations. Each ration contains six 12-ounce cans—one of meat and vegetable stew, one of meat and beans, one of meat and vegetable hash, and three of biscuits, confection and beverage. The ration also includes halazone tablets for purifying water. Two tablets are used for a quart of clear water and four for muddy water. Five tablets are provided each man daily.

If it is necessary to drop large quantities of water to troops, ten-gallon milk cans normally are used as containers.

With home sources hard-pressed to meet military and civilian food needs, the AAF has initiated a program to salvage and utilize waste materials. As an example of the accomplishments, one air station which used to buy 22,000 pounds of lard per month has since been able to reduce its lard requirements to zero. In one month, the cooks produced 25,000 pounds of fat by rendering it out and saving fat drippings. ☆

WHAT'S YOUR AIR FORCE I.Q.

Roll up your sleeves and spar for a mental round or two with this month's AIR FORCE Quiz. Chalk up the usual five points for each correct answer. A score of 90 to 100 is a little beauty; 80 to 90, good; 60 to 80 not too bad; below 60, room for improvement.

1. The distance in statute miles from Hollandia to Davao in the Philippines is approximately
a. 1,100 *c. 600*
b. 375 *d. 2,200*

2. In ditching a B-17, the top turret gunner should place his guns facing
a. Backward *c. Forward*
b. To the right *d. To the left*

3. If an engine exhausts black smoke, it means that
a. The mixture in the carburetor is too rich
b. There is a leak in the exhaust stack
c. The mixture in the carburetor is too lean
d. There is an excessive air leak in the bleeds

4. The location of 6th Air Force headquarters is
a. Hawaii *c. The Canal Zone*
b. Alaska *d. The Solomons*

5. The Navy's Corsair is a
a. Twin-engine, two-place, mid-wing monoplane
b. Single-engine, single-place, mid-wing monoplane
c. Single-engine, single-place, low-wing monoplane with inverted gull wings
d. Twin-engine, single-place, low-wing monoplane

6. The Balearic Islands are located
a. In the North Sea
b. Off the coast of China
c. In the Mediterranean
d. Two miles due east of Australia

7. A tandem airplane is a plane which has
a. More than two engines
b. Two seats, one behind the other
c. A retractable landing gear
d. Twin tail booms

8. Eglin Field is located in
a. Oklahoma *c. California*
b. Texas *d. Florida*

9. The E6B is
a. The night-fighter version of the P-38
b. A navigational computer
c. The military terminology used to refer to the 75 mm gun in the B-25
d. An anti-aircraft gun

10. The Jap aircraft popularly referred to as the Helen is a
a. Twin-engine medium bomber
b. Single-engine fighter-bomber
c. Twin-engine fighter
d. Four-engine bomber

11. Formosa is located
a. North of Tokyo
b. In the Marianas
c. Off the Chinese mainland
d. In the Malay States

12. The approximate oil pressure in pounds per square inch necessary to feather a prop is
a. 150 *c. 400*
b. 250 *d. 600*

13. A straight line from London to Berlin would cross
a. France *c. Denmark*
b. The Netherlands *d. Switzerland*

14. The term "Mayday" is often used
a. To call for help
b. To request a tighter formation
c. To indicate approaching enemy aircraft
d. To identify yourself as a friendly aircraft

15. The P-38 has a tricycle landing gear
a. True *b. False*

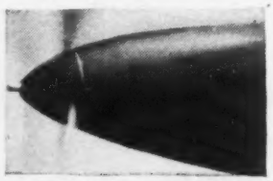
16. AAF personnel are not eligible to receive awards and decorations made by the United States Navy
a. True *b. False*

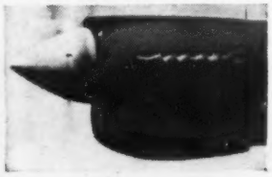
17. An aircraft flying at 150 mph ground speed consumes fuel at the rate of 21 gallons per hour. The consumption for a 250-mile flight at this speed would be
a. 35 gallons *c. 42 gallons*
b. 50 gallons *d. 63 gallons*

18. Subsidence is
a. A form of anoxia
b. An allowance for expenses incurred in performance of duty
c. The total aerodynamic force on an object
d. A meteorological term referring to a downward motion of air

19. The RAF Typhoon is a
a. Single-engine fighter
b. Twin-engine fighter
c. Twin-engine medium bomber
d. Four-engine bomber

20. Identify these aircraft. One incorrect, all incorrect:





Answers on Page 64

FLYING SAFETY

Suggestions from the Office of Flying Safety, Headquarters, Army Air Forces, in the interest of accident reduction.

These items are for educational purposes and are not to be construed as directives.

Faulty Taxiing Corrected

Proper taxiing should be one of the first things a pilot learns. Often, unfortunately, it isn't. Regional safety officers found one base where it had been necessary to change thirty brake assemblies in one month because P-39 pilots were using the brake-versus-power method improperly.

To combat the evil, the door was removed from an Airacobra and a temporary seat rigged along the catwalk. Now an instructor sits outside while he teaches the pilot correct taxiing habits.

Learning the 'Hard Way'

First Provisional Group, I Troop Carrier Command, has developed a novel method for correcting pilots who improperly fill out AAF Form 23.

Two offenders were required to pass an examination on proper completion of the form and on instrument and contact flight rules. Then each had to lecture on the subjects to other pilots in the group.

Briefing Record

A standard briefing check-list—a safeguard against incomplete compilation of essential data preliminary to a flight—has been devised by regional safety officers cooperating with training and operations officers at the B-17 Central Instructors' School, Lockbourne, Ohio, Army Air Base.

The Lockbourne form must be signed by the pilot and briefing officer for the flight concerned. It requires them to:

(1) Check Form 23 for complete entries.

(2) Check to ascertain that terrain altitudes along the route of the proposed instrument flight do not exceed the proposed flight altitude, but insure adequate clearance and a safety margin of at least 1,000 feet.

(3) Check to see that forecast weather, especially the ceiling, is compared with the pilot's proposed altitude. (When the proposed altitude is above the forecast ceiling, flight must be classified as instrument. The classification should be made by the pilot, but must be checked by the clearing authority.)

(4) Check route for correct altitudes (even or odd) on specified airways or direction of flight (east or west).

(5) Check destination to determine that runways are of sufficient length and strength for the type of aircraft involved.

(6) Check to ascertain that the ETE leaves twenty percent of fuel capacity available.

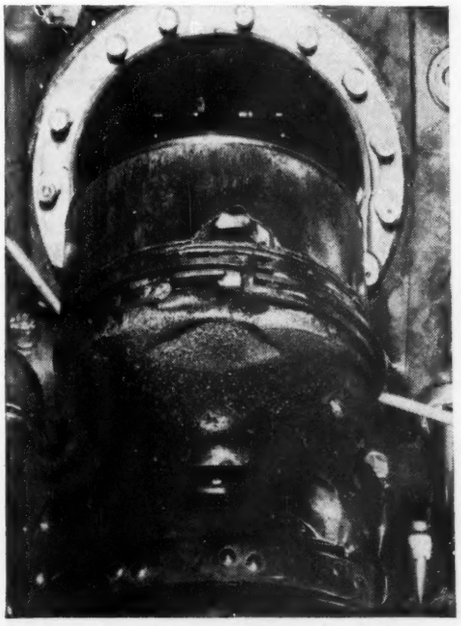
(7) Check alternate airfield. (On instrument flight, does airplane carry sufficient fuel to reach destination and alternate, plus 45 minutes?)

(8) See that pilot has filed list of check points as recommended by Pilots' Advisory Service.

(9) See that the weight and balance certificate has been signed.

(10) See that the pilot has certified he will instruct crew in emergency procedures before take-off.

The form includes the name of the station, type of activity and the date, and it may be retained as a permanent record of the flight. While it was developed for a particular base, OFS recommends that the form be adopted by other bases which do not use briefing check-lists or records. With slight variations it may be adapted to any type of activity.



Here's what happens to a piston when power limits are carelessly exceeded. The rings and sidewall are burned through completely and the entire assembly is pitted and scored. To impress pilots with the hazards of detonation, a heavy bombardment replacement training unit at Westover Field, Mass., posted an enlargement of this photograph in the ready room. It may be viewed with profit by every pilot who is inclined to use a heavy hand on the throttle.

OFS Service for Navy

At the Navy's request, all its plane flights in the continental United States have been receiving the Pilots' Advisory Service of the Office of Flying Safety since March 15. Six key Flight Control centers reported that Navy operations represented 35 percent of all military flights in their areas during a recent two-week period.

Needless Delay

The pilot who delays radioing a request for a weather report, change of flight plan, clearance or other information often makes it tough for himself as well as the men on the ground.

If he waits to contact a range station until he is directly over it, the flyer may be out of range by the time a reply is framed, thus necessitating forwarding the message to other stations.

By radioing a range station as far out as possible, the pilot gives Army Flight Control or CAA Airways Traffic Control, or both, a chance to have a reply waiting. Such promptness on the flyer's part not only assures him undelayed clearance but relieves overworked communications facilities of the extra effort of locating him.

Wear That Chute!

For years, the AAF has counselled its airmen to wear parachutes whenever and wherever possible. In that connection, 2nd Air Force's Aircraft Accident Analysis Council, a wide-awake safety outfit, reports this one for the what-might-have-been book:

A sergeant-gunner, sketching an airport from the nose of a B-17, spotted another ship rising speedily toward the Fortress. The next thing he knew the planes had collided and he was out on a wing holding for dear life to the shock cord from

the nose gun. He was wearing his harness, but his chute was still inside the plane.

The pilot and engineer managed to drag him to safety through the window of the pilot's compartment. But what if he had fallen free?

More on Wheels-up Landings

Commenting on the Hendricks Field procedures for wheels-up landings with B-17s, the 8th Air Force comes up with a couple of recommendations based on experience in England.

The comment deals with landings when both main wheels are retracted.

(A description of the Hendricks Field methods was distributed by the Office of Flying Safety.)

The 8th Air Force agrees that the tail wheel should be lowered for such landings—except for planes equipped with a chin turret. With such equipment, the 8th recommends that the tail wheel be left in the well.

The recommendation grew out of a near-perfect wheels-up landing by a B-17G which was SNAFUed when the extended tail wheel raised the tail and depressed the nose of the ship sufficiently to cause the turret to strike the runway. As a result, the nose section was ruined.

The 8th Air Force believes that prior to a belly landing the ball turret should be jettisoned if possible to eliminate the danger of damage to the plane by the ball being forced up into the interior. ☆

So P-47 pilots may become completely familiar with the plane's instrument panel and thereby be able instantly to recognize a condition requiring attention, an effective method of instruction has been devised by regional safety officers working with the 1st Air Force. Pilots view screening of film strips which pose 35 problems of control and instrument setting during various phases of operation. The strip reproduced (above) shows panel during the run-up before take-off. Designated by arrow and seen in close-up is the altimeter—the instrument which should catch the alert pilot's eye immediately. It is set below zero and therefore must be adjusted to field elevation.

P. & I. SAYS:

(The Prevention and Investigation Division, OFS, is composed of veteran flyers. These reports include comments by these veterans on recent accidents. Read and heed.)

GARDNER FIELD, Calif. — A dead stick landing necessitated by engine failure badly damaged a BT-13. Preliminary investigation indicated that inner parts of the engine gave way because of excessive compression brought on by oil or gas having partly filled the cylinders while standing idle.

P & I COMMENT: This is a good example of what can happen when an engine is not "pulled through" before it is started. Cylinders must be cleared out before power is applied. Oil does not compress, and something has to give way when it blocks moving parts. Although TOs require that engines be "pulled through," the importance of this operation must be stressed constantly, particularly in view of the presence in the AAF of many new maintenance men.

LOVE FIELD, Texas — A pilot in an AT-6 taxied under the wing of a parked B-24. The propeller cleared the leading edge, but struck amidship and chewed the rest of the way through the wing.

P & I COMMENT: This pilot made no effort to make sure he could clear the B-24's wing. He guessed. In this business you can't guess.

BARTOW, Fla. — One pilot was killed and two P-51s were demolished when the planes collided during unauthorized simulated combat.

The pilot who parachuted to safety was charged with complete responsibility for the accident. Both pilots, during briefing, had been specifically instructed to maintain distance from other aircraft.

P & I COMMENT: Too many fatal accidents have occurred during the past three months due to this type of violation of orders. In the first place, men still in training aren't full fledged combat pilots and shouldn't engage in maneuvers requiring a high degree of skill except under prearranged conditions. The little that the one pilot still alive learned about combat was more than offset by the loss of the life of a buddy and two expensive airplanes. In flagrant cases, perhaps a court martial is the only answer.

WILL ROGERS FIELD, Okla. — An A-20B was completely wrecked when the pilot made a forced landing after running out of gas.

Though the pilot signed the Form 1-A, he failed to notice or ignored the fact that the plane hadn't been serviced with gas following the previous flight.

P & I COMMENT: For whom is this pilot working?

EL PASO, Tex. — In an attempted take-off, a pilot retracted his landing gear too soon. Although he thought he had sufficient flying speed, the ship settled back on the runway causing major damage to the airplane.

P & I COMMENT: The altitude of this airfield is nearly 4,000 feet. Pilots should take into consideration the altitude of the runway and the flying characteristics of the airplane, then make sure it is airborne before retracting the gear. At 4,000 feet, much more speed is needed to sustain the airplane than is required at sea level. ☆

MEET BURMA

Prepared by the Arctic, Desert and Tropic Information Center

This key country in our drive against the Japs in Asia holds plenty of natural hazards for air and ground operations.

ANY road to Tokyo from southwest Asia must move across Burma. In many respects, this country sandwiched roughly between India and China holds the key to success of Allied drives to wash the Asiatic continent clean of the Jap.

But for military forces, Burma presents numerous operational problems, both as a fairly representative tropical area and as a peculiar combination of wet and dry, mountain and plain. Burma lies roughly in the same latitudes as Mexico, and the area covered is slightly smaller than Texas. Last spring's fighting took place in the rainy border mountains between the Assam-Bengal section of India and northwestern Burma. To the northeast, across the northern hill ranges, lie the Chinese Sikang and Yunnan provinces. Farther south, in the dry middle plain of Burma, is Mandalay, an important Irrawaddy River and railroad junction. To the east and southeast lie French Indo-China and Thailand, dominated by Japan, and on the southwest is the Bay of Bengal.

The climate is "tropical" — meaning warm and wet — but there are important variations, depending on time of year, location and altitude. The basic weather factor is the "monsoon," or prevailing wind, dry in winter, wet in summer. ("Winter" does not imply cold but rather the time of year.) The coastal areas are wetter than the back country, and the hills are both cooler and wetter than the plain and plateau country.

Monsoons should not be confused with storm winds. They are steady movements of air along the surface, resulting from variations of temperature between land and water areas. From December through February, the Asiatic land mass to the north cools, developing a high pressure atmospheric area. The cool air flows southward toward a low pressure area, the equatorial Indian Ocean, where warmer, lighter air is rising. This flow is the *winter monsoon*. Later in the spring, the earth becomes warmer than the ocean, creating a low pressure area, and by the end of May thunderstorms mark the reversal of air flow. Soon the *summer monsoon* begins, bringing moist air and rain from the south. Roads are bogged and land movement becomes difficult. Along about October, the rains decrease but the air remains depressingly humid.

The amount of rain brought by the monsoon depends on the altitude and the position of mountains. The wettest area in the world is the southern slope of the Khasi Hills in Assam. There rainfall averages over 400 inches a year and has been known to reach 900 inches. Akyab, a key strategic position on the western coast to the west of the Arakan Yoma range, may receive more than fifty inches in July alone, about what New York City averages in a year. The central Burma basin, including Mandalay, receives between twenty and forty inches, comparable to the average of our middle west. It may suffer from drouth in the dry season.

The hill area between Imphal and Myitkyina, the scenes of the Japanese attack and the Allied airborne invasion last spring, is well watered and covered by thick teak and oak forest. Military movement is dependent on roads and is easily disrupted by road blocks. The Arakan coast to the southwest tends toward thick rain forest—the typical "jungle" of the books and movies. Eastward, the Arakan Yoma range cuts off rainfall from the central basin where there is grassland and dry forest which loses foliage in the dry season.

Cloudiness, of great importance to flyers, is associated with rainfall. From October to April the skies are relatively clear, averaging less than ten percent overcast in central Burma and thirty or forty percent in Assam, lower Burma and Tenasserim, the long coastal strip bordering Thailand.

Cloudiness is greatest during the morning. During the summer monsoon, June to October, seventy to ninety percent of the sky is overcast most of the time. Low ceilings are fairly common along the coast. One morning out of four or five is likely to have a ceiling below 1,000 feet. Afternoon ceilings below 1,000 feet are most likely to occur in late spring. During the summer monsoon, ceilings below 2,000 feet can be expected about half of the days and are most common in the afternoon. Two-thirds of the summer days have ceilings below 3,000 feet. Mandalay, in the dry central basin, has an average of fewer than fifteen days a year when ceilings are below 2,000 feet. Over mountains, however, low ceilings are common in summer.

Visibility is good in most of the area during the cool months; it is less than 3,000 feet only about two or three days a month. Ground fogs on winter mornings are fairly frequent over the rivers and lowlands, and most frequent in central Assam, where they number about twenty a month. Mists and fogs may occur over some of the more humid forests and valleys during mornings of the rainy season. Fogs will form throughout the year on the windward mountain slopes at higher elevations because the winds carry moisture.

Dust storms are likely in the Irrawaddy basin, or central plain, between December and May when ground water is at a minimum. Elsewhere, they cause little concern. During spring, a smoke haze, caused by the native custom of burning over the land, forms over much of the area.

ANOTHER visibility factor is the occurrence of violent rain storms during the summer monsoon. These will often reduce ceilings to zero and horizontal visibility to twenty or thirty yards. These storms are usually localized, however, and can be avoided.

Icing of wings and control surfaces is not much of a problem at lower altitudes since frost occurs nowhere in the area below 3,000 feet. During the winter, when temperatures at greater altitudes are low enough for icing, water vapor in the air is at a minimum. During local storms in the cool season, temperatures may be low enough to cause icing trouble. In summer, water vapor concentrated by the cold masses of the monsoon may create icing danger above 10,000 or 12,000 feet in northern Burma. Destructive local hailstorms occur in Assam during April and May.

The small village is a key to many

characteristics of the people and the land. There are few isolated dwellings like the American farmhouse in the midst of the farmer's acres. As is the custom in many countries, the people walk out from the village to their fields every day. The comparative difficulty of travel and communication and the sociable nature of the valley peoples work against individual dwellings.

Villages are likely to be self-governing and fairly self-sufficient economically. The people choose their own headman and sometimes a village council, too. Another important factor in the general well-behaved quality of the Burman people is a tradition of strong family pride. Women have a place of respect unusual for Asiatic countries, and they wield some political influence. These conditions applied before the Japanese occupation, of course.

The prevalent democratic tone of the villages was supported by a level of literacy markedly higher than in other oriental lands. Public education for both sexes was encouraged by the British government. The majority of Burmans are Buddhists, and Buddhist writings are the basis of education. The Burmans themselves are free of the caste system, unlike the immigrants from India.

There is a tradition of craftsmanship among the Burmans; their finest crafts include lacquer painting, sculpture in stone, wood and ivory carving, metal working and casting, and silk weaving. They are independent about their work, and they will not haggle over prices. They are not lazy, but they see no point in working harder than is necessary.

The teachings of Buddhism tend to induce personal restraint and a soft-pedaling of ambition. Local good works, such as charity to each other and contributions to the yellow-robed monks (pongyis), who are respected as wise men, are considered part of a good citizen's duty. Every village has a temple on a prominent site.

The hill people with whom our soldiers came in contact in the spring campaign are quite distinct from the more advanced valley-dwelling Burmans. Such tribes as the Kachins, Chins and Nagas are more warlike than the Burmans, and they have been of good help as guides and fighters on our side.

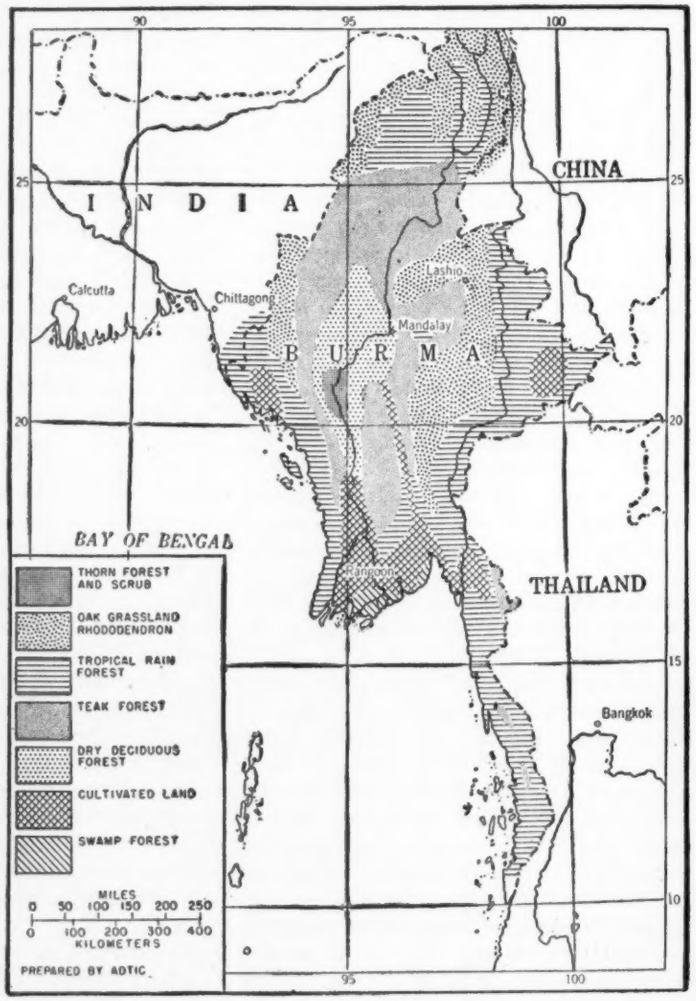
The northeastern Indian provinces, Assam and Bengal, are important as the jumping off place for any attack on Jap forces in Burma. Of the eight and a quarter million Assamese, more than half are Hindus, with caste traditions. The majority of the 51 million Bengali, however, are Mohammedan. Both of these provinces share the political and religious tensions which have been coming to a head in India, aggravated last winter by the Bengal famine.

Rice is the staple food all over Burma, Assam and Bengal. Of course there are other foods, such as fish, millet, maize and vegetables, but the various kinds of rice cultivation occupy the majority of the population. In the past, Burma exported rice to India. Orthodox Hindus eat no meat, and Moslems abstain from pork products.

Most of the western coast of Burma, the Arakan, was once covered by a dense tropical forest, which has since been largely cut down. There are still considerable areas of rain forest on the coastal plain, in the Tenasserim peninsula, in the Pegu Yoma hills and in well watered parts of the north. *(Continued on Page 64)*

Burma's mountain and river structure follows a definite north-south pattern. The average Burma range (yoma), even the Northern Hills, is much lower than the Himalayas. This map indicates the relation between the hills and rivers. Many of the latter cut through deep gorges.

What grows in Burma—and where—depends on rainfall, soil and relation of the area to mountain ranges. Burma's vegetation is plentiful but there is less jungle than popularly believed. The vegetation and agricultural zones of the country are depicted on this shaded-area map.



TECHNIQUE

Two views of the Black Widow night fighter reveal its similarity to the Lightning, with several other features distinctive from all other planes in combat. It is larger and has greater firepower than any AAF fighter craft.

The Black Widow

THE P-61 Black Widow is the largest fighter plane ever built in this country.

A twin-tail, twin-engine fighter that looks like an overgrown P-38, the P-61 came into being as a result of action in the early days of the war when London was the bombing target and not Berlin. The Luftwaffe's raids under the protective cover of darkness had brought home the great need for a fast night fighter plane with plenty of firepower to be employed as defense against night bombings.

We had no such plane, but in the spring of 1941 one was put on the design boards. Little more than a year later, it was flying over California. This was the P-61. Originally, two experimental airplanes were built, followed by the usual thirteen service test airplanes. The P-61s now are in production.

Built by the Northrop Aircraft Corp., Hawthorne, Calif., the P-61 is the first functional night fighter to come out of this war. Planes previously used for such tactical missions have been modified versions of aircraft originally planned for other types of operations. There are, for example, the A-20s and the A-29s, light bombers, used for attack missions. Naturally, these airplanes lacked some refinements necessary for top efficiency in night fighter tactics. These characteristics or refinements the P-61 has in its unconventional design, high horsepower and heavy firepower.

Classified as a fighter aircraft, the P-61 is larger and weighs more than either the A-20 or the P-70, night fighter version of the Boston.

Inside the P-61's low-slung engine nacelles, that taper off with streamline effect into the thin tail-booms supporting the elevator and rudder surfaces, are two powerful Pratt & Whitney engines. Developing high horsepower at take-off, the engines, turning four-bladed Hamilton Standard propellers, pull the ship into the air in a comparatively short take-off run, give it good climb and maneuverability.

Because night landings on war-time fields are hazardous for fighters, new flaps and ailerons have been incorporated into the P-61. It has full span landing flaps which run almost the whole length of the outer wing panels, leaving no room for conventional ailerons. A unique system of "spoiler type" ailerons was developed. These actually are small "gates" which lift up out of the top surface of the wing and break the airflow thus "spoiling" the lift and dropping the wing, causing the airplane to tilt in one direction or the other—basically the same effect produced by the conventional aileron.

In profile, the P-61's fuselage looks like a bloated jelly fish. It is very narrow and, although the nose section sticks out in front several feet ahead of the propeller hubs, the fuselage tapers down and quits almost with the trailing section of the big wing. Its speed, of course, is still secret, but it can hold its own with some of our fastest medium altitude fighters.

All crew members are protected by armor plate deflector shields and bullet-resistant glass. The ship also has self-sealing gasoline and oil tanks and lines.

The airplane is a good performer. One pilot, who has flown the ship extensively since the first "X" models explains: "The P-61 is an honest airplane. It has no mean tricks. In acrobatics such as loops, spins, Immelmanns and fast turns, it behaves as a pursuit should and its stalling features are near perfect." — **Maj. F. P. Jenks, Production Division, Materiel Command, Wright Field.**

Automatic Pilot for Gliders

Gliders can now negotiate blind flying or self-controlled flight with the aid of a new automatic pilot developed by the glider branch of the Aircraft Laboratory at Wright Field. Officially the instrument is called the D-1 automatic pilot, an adaptation of the famous A-3 type used for some time on many bomber and transport planes.

The automatic pilot for gliders is a standard type used in many of our powered aircraft, with slight modifications. In the power ship, for example, the pilot must operate the automatic pilot manually in order to accomplish turns, ascent or descent. In the glider this is accomplished by the transmitter arm, a steel rod affair which extends from the nose of the glider, thus eliminating the human element.

When the rope is attached to the tow-plane and glider, the end of the transmitter arm is placed on the tow-rope where it rides during the flight. As the tow-plane changes direction, the attitude of the rope is picked up by the transmitter arm and relayed by a series of pulleys to the controls and sensitive mechanisms of the automatic pilot. These "impulses," or activated motions, are then reflected by the automatic pilot which, in turn, changes the controls of the glider so that the ship is in relatively the same position as the tow-plane.

There are many tricks in the operation of the D-1. For instance, before engaging the automatic pilot the glider pilot gets the ship into the best position for tow. He then sets trimming devices and engages the automatic pilot. He probably will have to make a few minor corrections, but from then on the automatic pilot will take over. Even in rough air the automatic pilot will do the same thing in a glider that the A-3 will do in a powered aircraft. **— Staff Sgt. Douglas J. Ingells, Air Force Staff Correspondent, Wright Field.**

Spinning Runways

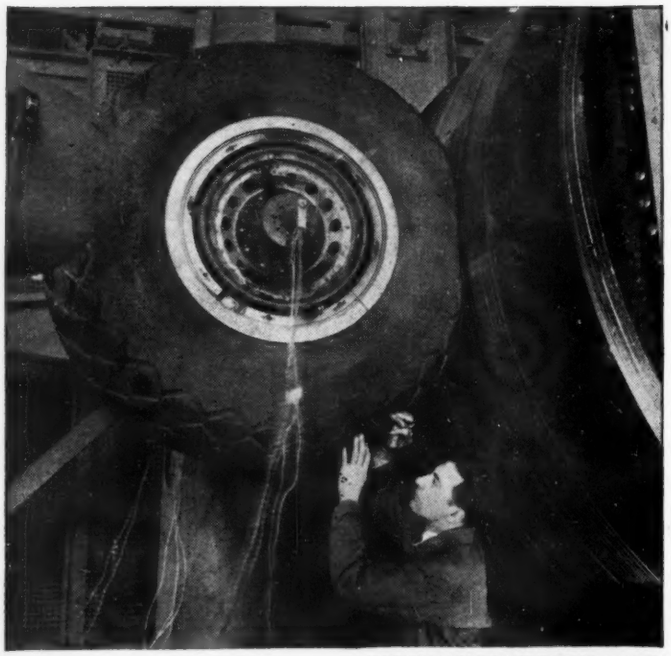
Huge inertia wheels, capable of testing tires twice the size of the XB-19's — world's largest — have been installed at Wright Field to assure safety in withstanding the impact of 60,000- to 120,000-pound airplane loads on all types of runways.

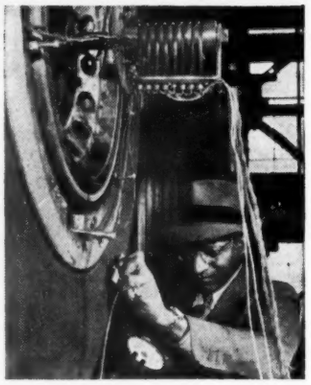
The tests conducted by AAF engineers are highly unorthodox. With the airplane wheels at a standstill, the "runway" is moved at speeds equivalent to the landing speeds of a fighter or bomber depending on the test in progress. The "runway" in this case is a gigantic flywheel turned by an electric motor. When it reaches a specified rpm, the aircraft wheel, tire and brake under test, are rammed against it hard enough to simulate the impact of an airplane's undercarriage against the ground in a normal landing.

With sensitive strain gauges, thermometers and other recording devices attached to the wheel, tire and brake mechanism, data are obtained which would be impossible to get from actual landing tests.

Purposes of these tests are to develop brakes that will stop an airplane in as short a landing run as possible and to perfect tires and wheel structures capable of withstanding the intense frictional heat generated by sudden acceleration of the tires on impact and by brake application. Efficiency of original wheel installation designs frequently has been nearly doubled as a result of such tests.

On B-17s, for instance, the original wheel and brake design was built to stop the airplane in a limited landing run with a normal gross load of 38,000 pounds. Inertia wheel tests have led to the development of brakes that, with the same size airplane tire and wheel, will stop the bomber at combat gross weight of 60,000 pounds. Similarly a P-40's braking efficiency was increased by 33 percent. Translated into combat terms, better brakes and lighter-weight wheel assemblies permit more effective operation from small landing fields in combat theatres.





Inertia wheel tests such as this provide necessary information for improvement of aircraft brakes and tires. Below, a workman, using a hypodermic needle, checks the heat generated between tire and wheel.

Responsible for many of these developments is the wheel and brake unit of the Materiel Command's aircraft laboratory. Basically the experts have their work divided into four major categories: (1) Improving brake linings and other rubbing surfaces, (2) strengthening wheel structures, (3) obtaining more efficient heat dissipation from brake drums, and (4) reinforcing tires to stand the additional loads. The formulae that guide them to these improvements are obtained from the tests on the big inertia wheels.

These brake-testing machines can test wheels and tires that range in size from the small main wheels on a Piper Cub (twelve inches in diameter) to gigantic fifteen-foot diameter tires to go on any such bomber that may be designed in the future to warrant tires of such size. Fitted with special arms and brackets, the machines also can be used for testing tractor-type landing gears now in use experimentally.

The smallest of the test rigs has a 66-inch diameter flywheel capable of building up 5,000,000 foot pounds of kinetic energy. It can test wheels and tires up to 44 inches in diameter, or those comparable to the wheels on the A-20. Next in size is the 120-inch inertia wheel which will test wheels up to 96 inches in diameter. Used to run the tests on the B-19's tires, this machine stores 25,000,000 foot pounds of kinetic energy—almost double the amount of energy exerted on the wheels of a B-17 (14,000,000 pounds) when they strike the runway in a normal landing.

The newest inertia wheel is 192 inches in diameter and is

capable of storing 200,000,000 foot pounds of kinetic energy; enough to cause a blow-out instantly in one of the B-19's tires.

Immediately after a test, when tires are blistering hot and there is danger they might explode momentarily, engineers jab the tire with a hypodermic needle to obtain a temperature reading of the internal tire casing.

This is extremely dangerous; if they should hit the tube with the needle, they would "blow up with the tire." Results are making it possible, however, to get better material for aircraft tires, to know the heat resistant qualities of existing synthetics and natural rubber, and determine other important related factors.

Tests can be run at the rate of four an hour, equal to the number of landings that can be made in that time with an airplane under normal conditions. It takes approximately fifteen minutes to run a complete test, including the time that it requires to get the big inertia wheel up to sufficient speed. After each test, big fans cool the wheel and tire before another test can be run.

Great care is taken that the giant flywheels are perfectly balanced. Their solid steel bulk on the running surface is as smooth as a turret's glass. This prohibits roughing them up to simulate rough-surfaced runways.

Rolling tests are conducted on the same machines. For this test, instead of applying brake forces, the wheels are allowed to roll to a stop. Such tests reveal that tires can last for more than 2,000 miles, equivalent to about 500 landings. — **AIR FORCE Staff Correspondent, Wright Field.**

New Engine Cooling Fan

A multi-bladed cooling fan which sucks air into the engine from around the propeller hub soon may be adapted to some AAF airplanes. This fan, by forcing more air through the engine cowling, is expected to improve performance of planes powered by air-cooled engines.

Main limiting factor in full-power operation of some aircraft engines has been excessive heat at low speeds or during warm-up. More efficient cooling, however, permits the development of greater horsepower in such engines and this means increased rate of climb, cruising speed, and high altitude performance as well as gross load capacity.

Developed by the Wright Aeronautical Corp., the new cooling fan now is being tested by the NACA and Materiel Command.

Because propeller blades are well out from the hub, they force very little air through the engine cowling. At high air speeds, airflow is accelerated but at low air speeds, such as during long take-off runs or steep climbs, airflow through the engine is limited and danger of overheating may prevent maximum power output.

By maintaining a constant flow of high-pressure air through the engine cowling, cooling fans in Wright Aeronautical tests have enabled engines to develop enough additional horsepower to increase rate of climb as much as twenty percent and to increase the pay load of some types of twin-engine planes as much as 10,000 pounds. ☆

WHAT'S NEW

AUTOMATIC STABILIZER FOR AERIAL CAMERAS — Accuracy of topographic mapping is being simplified by developments of Materiel Command's photographic engineers. To keep the aerial camera on an approximately level plane, despite the rolling and pitching of an aircraft, an automatic stabilizing unit has been perfected. Two pendulums, one for tip and one for tilt, actuate an electro-magnetic circuit when the plane pitches or rolls. This, in turn, controls the levelling motors that return the camera mount to a level position relative to the ground. The new device increases the accuracy of picture taking over extensive areas and facilitates the fitting together of the many photos required for a comprehensive mosaic.

AIRBORNE FUEL SERVICING TRAILER — Designed for easy transportation in a C-47, a new 220-gallon fuel servicing trailer which can be towed in tandem trains has been standardized for allocation to AAF units. (AAF Reg. 65-39 for allocation.) The three-wheel unit can be towed in train by a jeep at twenty miles an hour over rough terrain. Nozzle capacity of thirty gallons a minute is provided by an efficient hand pump, which also incorporates a segregator float to eliminate water from the gasoline. With the new unit, use of five-gallon cans and 53-gallon drums is no longer necessary. Several of these units can make possible the simultaneous servicing of an entire squadron of fighters in their dispersal areas. Official name is Fuel Servicing Trailer Type A-2A.

CUSTOM-BUILT RESCUE KITS — Special emergency equipment is available at Wright Field's equipment laboratory for AAF units operating over unusual terrain. ATC's India-China Wing, for instance, needed a complete, but specialized, rescue kit containing both arctic and tropic accessories for crews that might have to bail out over the snow-covered mountains or tepid jungle valleys of the Hump run. On ATC's specifications, 250 of these kits were assembled and dispatched to India in a period of a few weeks. Because 100-foot high jungle growth completely swallows up parachutes, a 300-foot red and white streamer was attached to the kit to facilitate spotting of the supplies by survivors on the ground.

FREE-FALL AERIAL DELIVERY BOX — A specially constructed wood box that can be dropped from 1,500 feet without a parachute ha been designed by the Materiel Command for use when parachute aerial delivery containers are not available. Tests indicate that breakable items, such as bottled medical supplies, can be dropped in this box with a normal recovery of 70 to 100 percent. Pyramidal ends help absorb the shock of hitting the ground; it is nailed and glued together and reinforced in the corners with quarter rounds; the outside is bound with four pieces of wire. Such boxes can be made from scrap materials. Construction directions have been published for use of overseas squadron engineering officers.

EVACUATION GLIDER — Conversion of a standard CG-4A glider into an evacuation hospital unit has been completed by the Materiel Command. The glider contains six litters, six seats for walking patients and a ground pick-up station. The pick-up station is packed in a kit and can be set up easily when the glider is ready to be picked up by a tow plane. Although designed primarily as a glider ambulance, the secondary rescue function may increase further the value of this converted CG-4A which can land and be towed off in a 500-foot clearing.

FLUSH STATIC TUBES — A new type of flush mounted static tube installed on an airplane's fuselage now is being used on AAF planes. The device, originally developed by the British, incorporates design modifications and a new disc mounting engineered by the Materiel Command's equipment laboratory. Because of its location, flush against the fuselage, the new installation materially reduces the fractional errors in air speed recordings that resulted from air turbulence around the conventional type pitot-static tube, normally suspended from the fuselage or wing on a long pitot boom. The static tube plates or mounting flanges are about two inches in diameter and have seven small holes in the center to pick up static pressure, i.e., the variations of air density with altitude. Flat, with extremely smooth surfaces, these plates are flush with the airplane's skin thus permitting a smooth flow of air over the fuselage. They pick up minute variations in air speed and static pressure which the conventional type of tube might not obtain.

FUSELAGE REINFORCED WITH GLASS — A glass reinforced plastic fuselage, side panels and tail cone have been fabricated by engineers of the aircraft laboratory and successfully flight tested at Wright Field on a modified BT-13. Tests of the sandwich construction—balsa wood core between an inner and outer skin of plastic reinforced with fibrous glass cloth—indicate that on a strength-weight basis, the new fuselage construction is fifty percent stronger than the metal fuselage and eighty percent stronger than the wood fuselage now in service. When subjected to gunfire, the material did not flower, and explosive projectiles passed through without detonating because of the low density of the wood-plastic-fibrous glass cloth material. ☆

NOTES ON

WOMEN'S ACTIVITIES IN THE AAF

NEW HEADQUARTERS FOR NAAFW

Applications for membership in the National Association of Air Forces Women, the formation of which was announced in the March issue of AIR FORCE, have been so numerous that another headquarters has been obtained to handle the flood of mail arriving daily from all parts of the country.

The new headquarters address is: National Association of Air Forces Women, 1702 K Street, N. W., Washington, D. C. The office is small and unpretentious but the enthusiasm of the air force women volunteers who work there makes up for the lack of usual office trappings. They work long hours daily, taking care of the enormous number of requests and suggestions that come from enlisted men, officers, Wacs and AAF wives everywhere.

A man in the jungles of New Guinea writes that his wife can and would like to help. A letter is received from the wife of a man on duty in England; her husband had read of the association at his base. Wives of new cadets write in. So do the sisters, mothers and widows of thousands of AAF men. Many of the letters carry helpful suggestions for use in later NAAFW plans; most of them enclose the $1.00 dues for members-at-large, and scores are letters of appreciation and enthusiasm for the concrete plans of service the NAAFW will give to AAF personnel and their families.

First on the list of jobs to be done at the new headquarters was the revamping of the NAAFW's constitution to provide for this sudden expansion—a move which many of the group's organizers had hoped might come later but the need for which none had believed would be so instantaneous or widespread.

One change makes possible the inclusion of "clubs," in answer to a large number of requests for information that came from mothers' clubs and similar groups. The initial plan included only those AAF women's clubs composed chiefly of AAF wives, which are set up at each AAF station. Now, however, any club whose membership is composed exclusively of AAF women is eligible for membership as a group upon application to and approval by the NAAFW executive board.

Such clubs must be non-political, and any infraction of this provision will be cause for immediate termination of affiliation with NAAFW. Dues for these clubs will be 25 cents for each member on the basis of the average membership of the club. Groups are requested to send this amount in an annual lump sum to the treasurer, NAAFW, at the K street address.

A further change provides that any wife, mother, sister, daughter or widow of any man who is, or has been, on active duty with the AAF may if no member club is available, become a member-at-large of NAAFW upon application and approval by the board. Women wishing to join are instructed to include with their application $1.00 for annual dues, together with the *name, address* and *Army serial number* of the man in whose interest they are making application. This will facilitate prompt action and prevent confusion in recognizing the applicant's right to membership.

VOLUNTEER TAILORS

A stitch in time saves not only nine but at many of our fields, it saves dollars and cents—and plenty of time—for the government and the men in the AAF.

A statistically-minded quartermaster at the Ontario (Calif.) Army Air Field, compiled figures on the savings resulting from the mending and repair work done there by AAF officers' wives serving in the women's volunteer branch of the Personal Affairs Division. His compilations show that from November, 1943, to February, 1944, the reconditioning of clothing, thereby obviating replacement issue from GI stocks, saved $249.25. Slacks and blouses, field jackets and overcoats, and even the lowly sock, were put in excellent condition by these women.

When 3,000 men who were being shipped within two days suddenly needed chevrons and insignia sewed on at Logan Field, Colo., the CO appealed to the field's Red Cross volunteers. Enlisted men volunteered to bring in sewing machines and check bundles, and the AAF women kept needles humming until 0230 the first night. By 2330 the next day the job was finished—five garments for each man, 15,000 in all. Since then, the women have done a repeat job on this order—twice.

SERVICE, COMPLETE WITH "SITTERS"

The information desk at post headquarters, Morris Army Air Field, N. C., is practically the last word in service for new arrivals. Manned by AAF women volunteers, this office supplies information on schools, churches, clubs, employment agencies, bakeries, dairies, names and addresses of all post personnel, lists of committees and post activities—and for all we know, advance dope on bargain basement sales. Most in demand is their list of "sitters" who will come and stay with baby while you and the wife take in that bridge game at the Wallaces' next Friday. ☆

Roll of Honor

A MONTHLY RECORD OF DECORATIONS AWARDED TO PERSONNEL OF THE ARMY AIR FORCES

DISTINGUISHED SERVICE CROSS

Barbiero, Samuel S., T/Sgt.
Barks, Arthur E., Lt.
Burdue, Clayton C., S/Sgt.
French, Lifford E., T/Sgt.
Geiser, Anthony W., Capt.
Henry, Maurice V., T/Sgt.
Johnson, Thomas E., S/Sgt.
Moore, Carl W., Sgt.
Petty, Charles A., Lt.
Price, Herbert M., Lt.
Radtke, Dean M., Lt.
Ray, Charles P., Lt.
Ridolfe, Peter J., S/Sgt.
Spencer, Charles W., Lt.
Storovich, Robert D., S/Sgt.
Troy, Edward P., S/Sgt.
Vitale, Chester A., Lt.

LEGION OF MERIT

Good, Lloyd T., S/Sgt.
Howard, Thomas G., T/Sgt.
Rainey, Leroy A., Col.
Romerman, Jack, Lt. Col.
Snavely, Ralph A., Col.

SILVER STAR

Bradley, Frank E., T/Sgt.
Burrell, Harry R., Maj.
Butler, Gilbert E., Capt.
Byerly, Jean R., Col.
Colbert, Martin S., Sgt.
Collins, Frank J., Maj.
Daniel, Wayne L., Capt.
Donovan, Eugene, S/Sgt.
Fennessey, James D., Lt.
Forbes, Thomas W., T/Sgt.
Fletcher, Leo C., Lt.
Froning, Alfred C., Lt.
Georgi, William F., Capt.
Graff, Theodore, Lt. Col.
Hagenback, James J., Capt.
Horton, Lewis T., T/Sgt.
Hull, Charles T., Lt.
Knox, Robert T., Maj.
Litchfield, John S., Capt.
McCarroher, Edward R., S/Sgt.
Merrick, Raymond J., S/Sgt.
Morrow, Richard J., Lt.
Moye, Otis B., S/Sgt.
Nemeth, Stephen, S/Sgt.
Pelletier, Mark C., Jr., S/Sgt
Perryman, Jack L., S/Sgt.
Polland, Clyde A., S/Sgt.
Putek, Henry, Lt.
Rex, Joseph F., Sgt.
Robertson, Bodie F., S/Sgt.
Robichaud, Joseph E. R., S/Sgt.
Rogers, Elmer J., Jr., Col.
Spencer, Charles R., Maj.
Sternfels, Robert W., Capt.
Taylor, Oliver, Lt. Col.
Temple, William W., F/O
Thurman, Wayne E., Lt. Col.
Webster, Robert N., Brig. Gen.
Welch, Mack D., Jr., S/Sgt.
White, John F., S/Sgt.

OAK LEAF CLUSTER TO SILVER STAR

Athey, Carle T., Sgt.
Eckholt, David J., Pvt.
Madison, Wilard R., Pfc.
Massing, Daniel G., Lt.
Olson, Harlan H., Capt.
Osborn, Arnold G., Pfc.

DISTINGUISHED FLYING CROSS

Aalto, Reino L., Lt.
Abbott, William G., Lt.
Abel, Dunstan, Lt.
Abeloff, Lester G., Capt.
Aberson, Albert D., Lt.
Abeyta, Isaac, Sgt. (& OLC)
Able, John J., S/Sgt.
Abney, Howard L., S/Sgt.
Abraham, Jake L., Lt.
Abramovich, Peter P., S/Sgt.
Abrams, Philip, Sgt.
Abramski, Emileo J., Sgt.
Ackerman, Harry, Capt. (& OLC)
Ackley, Coburn E., Lt.
Ackley, Duncan B., Lt.
Adair, Asa A., Lt.
Adamczyk, Theodore S., Sgt. (& OLC)
Adamen, Stanley, S/Sgt.
Adams, Alva T., Jr., Lt.
Adams, Benjamin C., Lt.
Adams, Carl F., Lt.
Adams, Charles J., S/Sgt.
Adams, Clifford B., Lt.
Adams, David A., Lt.
Adams, Edward Bowie, Lt.
Adams, Grady, S/Sgt.
Adams, John M., Lt.
Adams, Joseph A., Lt.
Adams, Julian R., Jr., Capt.
Adams, Lionel E., S/Sgt.
Adams, Luther A., Lt.
Adams, Lyle M., Capt.
Adams, Michael E., Lt.
Adams, Richard A., Lt. (& OLC)
Adams, Robert G., S/Sgt.
Adams, Robert H., Lt.
Adams, Robert P., S/Sgt.
Adams, Robert W., F/O
Adams, Urban S., Capt.
Adcock, Roy D., Lt.
Addison, Richard E., S/Sgt.
Aden, Burton E., T/Sgt.
Adkins, Edwin W., Capt.
Adkins, Woodrow W., S/Sgt.
Adler, Irving, Lt.
Adler, Monroe A., Lt. (& 3 OLC)
Adler, Paul, T/Sgt.
Adler, Robert T., Lt. (& OLC)
Adrianse, Lyle A., Capt.
Aenchbacker, Arthur Eugene, Lt.
Affronte, Samuel J., Pvt.
Agriropulos, Theodore, Capt.
Aguirre, Richard U., Lt.
Albert, Edgar J., Lt.
Albine, Robert L., S/Sgt.
Albrecht, Rudolph W., Lt. (& OLC)
Albright, Charles O., T/Sgt.
Albright, Charles W., S/Sgt.
Albright, Clarence L., S/Sgt.
Albright, Robert H., S/Sgt.
Aldworth, Donald L., Lt.
Alesauskas, John S., S/Sgt.
Alexander, David W., Lt.
Alexander, Chester R., T/Sgt.
Alexander, Jack D., Lt.
Alexander, James H., Capt.
Alexander, James R., Jr., Lt.
Alexander, James W., T/Sgt. (& OLC)
Alexander, Lester J., T/Sgt.
Alford, Homer W., T/Sgt.
Alford, Perry C., Jr., T/Sgt.
Alger, Martin P., Capt.
Alison, Robert F., Capt.
Allard, Robert H., Lt.
Allbright, William F., Lt.
Allen, Aaron L., S/Sgt.
Allen, Arthur H., Jr., Lt.
Allen, Benjamin H., Lt.
Allen, Brooke E., Col.
Allen, Clayton F., Lt.
Angel, James A., Capt.
Angelini, Joseph S., T/Sgt.
Anglin, Raymond E., Lt. (& OLC)
Anker, Norman H., T/Sgt.
Anszperger, Constant, Lt.
Anthony, Charles E., Sgt.
Antonelli, Daniel J., S/Sgt.
Antonik, John C., Lt.
Apai, Robert G., Lt.
Applee, Frank H., S/Sgt.
Applewhite, Thomas B., Lt.
Appold, Norman C., Maj. (& 2 OLC)
Apy, William A., S/Sgt.
Aqualino, Julio J., S/Sgt.
Arant, John R., Lt.
Arasin, John C., S/Sgt.
Arbon, Paul, Lt.
Arbuthnot, George S., Lt.
Archer, Ripley B., Lt.
Archibald, James H., Jr., Lt.
Arciero, Bernard E., S/Sgt.
Arena, Vincent, S/Sgt.
Arena, Herbert W., Lt.
Argenton, James, S/Sgt.
Ariano, Richard A., Lt.
Arkin, Sanford L., Lt.
Armagost, Donald V., S/Sgt.
Armes, William, S/Sgt.
Armstrong, Emerson L., Lt.
Armstrong, Herbert W., S/Sgt.
Armstrong, Lorraine F., Capt. (& OLC)
Armstrong, Melvin T., T/Sgt.
Armstrong, Robert Emile, Capt.
Armstrong, Robert Emerson, Jr., Lt.
Arneson, Arlie G., S/Sgt.
Arnold, Albert G., Lt.
Aschenbrener, Robert W., Lt. (& 2 OLC)
Ashbrook, Truman R., F/O
Ashcraft, Lawrence J., S/Sgt.
Ashcroft, Fordyce G., Lt.
Ashley, Frank N., Lt.
Ashton, Burton S., Sgt.
Ashworth, George S., Jr., S/Sgt.
Ashworth, George W., T/Sgt.
Askelson, Howard S., F/O
Asper, Orlando C., Lt.
Astrologo, Rocco M., Lt.
Astyk, John F., S/Sgt.
Atchison, Delmar W., Capt.
Atchue, Henry W., S/Sgt.
Atherton, Clinton E., Lt.
Athey, Verl C., Lt.
Atkeson, James B., T/Sgt.
Atkinson, John M., Capt.
Attaway, James A., Lt.
Atteberry, Lloyd E., Lt.
August, George E., Pvt. (& 2 OLC)
Augustyn, Leo J., Pvt.
Aune, Rudolph, S/Sgt.
Auner, Thomas W., Lt.
Austin, Horace W., Jr., Lt.
Austin, Odie C., T/Sgt.
Austin, Omar A., T/Sgt.
Avendano, Joseph, Lt.
Avery, Earl H., Lt.
Avery, Hamilton K., Lt.
Axt, Harold, S/Sgt.
Aycock, Jesse D., Jr., S/Sgt.
Ayers, James W., S/Sgt.
Ayers, John T., Lt.
Ayers, Samuel E., S/Sgt.
Ayling, Edward C., S/Sgt.
Ayres, Arthur B., S/Sgt.
Baart, James C., S/Sgt.
Babel, John S., Lt.
Babich, John A., Sgt.
Baca, Frank C., S/Sgt.
Baca, Julius A., Pvt.
Bacha, Elias, Lt.
Bacher, Raymond C., Lt.
Bachert, Kurt W., S/Sgt.
Bachrach, Robert I., Capt.
Bacon, Warren F., Lt.
Bacsik, George, Lt.
Bader, Don C., Lt. (& OLC)
Bader, James F., Capt.
Bader, Joseph C., S/Sgt.
Badois, John J., S/Sgt.
Baer, Charles R., Capt. (& 2 OLC)
Baer, Donald P., T/Sgt.
Baer, Edward L., S/Sgt.
Baganz, Paul C., Lt.
Bagwell, Clayton R., S/Sgt.
Bahnmiller, Melvin C., S/Sgt.
Bailey, Boyce S., F/O (& OLC)
Bailey, Brunnel F., S/Sgt.
Bailey, Clark G., T/Sgt.
Bailey, Dennard J., Cpl.
Bailey, Felix R., Lt.
Bailey, George W., Lt.
*Bailey, Harold M., Lt.
Bailey, James A., Lt.
Bailey, Neil Q., Lt.
Bailey, Richard G., S/Sgt.
Bailey, Richard H., Lt.
Bailey, Robert G., Lt. (& OLC)
Bailey, Walter C., T/Sgt. (& OLC)
Bailey, William B., Maj.
Bailey, William H., Lt.
Bainer, John L., Lt.
Bair, Charles L., Capt.
Baird, Archer M., Lt.
Baird, Elmer S., Lt.
Baker, Leroy E., S/Sgt.
Baker, Robert H., Lt. (& 2 OLC)
Baker, Robert N., Lt.
Baker, Royal N., Lt.
Baker, Wylie G., S/Sgt.
Balason, John M., Lt.
Balazovich, Michael J., S/Sgt.
Baldry, Gordon L., Lt.
Baldwin, Ivan D., Sgt.
Baldwin, Raymond W., Jr., Lt.
Bale, Jewett A., T/Sgt.
Bales, James Y., S/Sgt.
Balke, Darrel L., S/Sgt.
Ball, Harry C., Lt.
Ball, James D., F/O
Ballah, Roy T., Capt.
Ballard, Charles E., S/Sgt.
Ballard, Clair C., Lt.
Ballard, Roy M., S/Sgt.
Ballert, George E., Lt.
Ballew, Oscar E., T/Sgt.
Balls, Butler, Lt.
Balsley, John D., T/Sgt.
Baltezor, Jesse N., F/O
Balton, Bradford E., Lt.
Baltrusaitis, William J., Capt.
Banack, Stanley F., M/Sgt.
Banbury, Richard D., Capt.
Bancroft, George, Lt.
Bancroft, Harvey C., S/Sgt.
Bank, Harold J., Lt.
Bankhead, Heber B., Lt.
Banks, Clyde M., Lt.
Banks, David H., Lt.
Banks, Raymond K., S/Sgt.
Bard, Howard W., T/Sgt.
Barfoot, Thomas W., Maj.
Barker, Douglas S., Lt.
Barker, Forrest H., Maj.
Barker, James W., Sgt.
Barker, John C., Lt.
Barkhurst, Andrew L., S/Sgt.
Barkley, Ulyus Q., S/Sgt.
Barlow, Benjamin, T/Sgt.
Barlow, James D., Maj.
Barmettler, Harry J., T/Sgt.
Barnaby, Harold T., F/O
Barnard, Lester L., Lt.
Barnebey, Lauren R., Lt.
Barnes, Aurben C., Sgt.
Barnes, Clayton J., Lt.
Baseler, Robert L., Lt. Col.
Bass, Bernie S., Lt.
Bass, Milton K., Sgt. (& OLC)
Bassett, Lloyd M., Jr., T/Sgt.
Bassett, Wilmer H. C., Lt.
Basye, William E., Lt. Col.
Batchelor, Barnes H., Sgt.
Batdorf, Gordon E., Lt.
Batdorff, Richard M., T/Sgt.
Bates, Clifford, S/Sgt.
Bateson, Charles E., III, Lt.
Baugh, Cloyd, Cpl.
Baughn, Harry G., S/Sgt. (& OLC)
Baum, Samuel I., Lt.
Baum, Thomas G., F/O
Bauman, Rexford G., Lt.
Bawol, Chester M., Lt.
Baxter, Jack, S/Sgt.
Baxter, Lloyd M., T/Sgt.
Baxter, Ralph W., S/Sgt.
Baya, Joseph L., S/Sgt.
Bayer, Earl J., S/Sgt.
Bayley, Edwin T., Lt.
Beach, English F., S/Sgt.
Beal, Thomas W., F/O
Beall, Clyde F., F/O
Beard, William A., Lt.
Beardsley, James C., Capt.
Beasley, Alfred E., S/Sgt.
Beatie, Ernest D., Lt.
Beatty, Clyde W., Jr., Lt.
Beatty, Francis S., S/Sgt. (& OLC)
Beatty, Joseph R., S/Sgt.
Beauchamp, John W., Lt.
Beauchamp, Newton E., T/Sgt.
Beaumont, Willard R., Lt.
Beavers, Albert T., S/Sgt.
Bebout, Charles R., S/Sgt.
Bebout, Lester V., S/Sgt.
Becht, Cletus A., Lt.
Bechtel, John R., Capt. (& OLC)
Bechtel, Ray M., S/Sgt.
Bechtol, Kenneth E., S/Sgt.
Beck, Abe J., Maj.
Beck, Howard K., Lt.
Beck, James H., T/Sgt.
Beck, Richard W., Lt.
Bell, Raymond J., S/Sgt.
Bell, Richard T., S/Sgt.
Bell, William E., S/Sgt.
Bell, William H., Lt.
*Bellovay, Steve, Jr., Lt.
Bellows, Charles E., Lt.
Belser, Joseph H., Lt.
Bement, Barry W., Sgt. (& 2 OLC)
Bendiner, Elmer S., Lt.
Benecki, William A., S/Sgt.
Benedict, Roy, T/Sgt.
Benedict, William P., Lt.
Benham, Edward D., Lt.
Benish, Thomas J., S/Sgt.
Benjamin, Floyd S., Lt.
Benko, Arthur J., S/Sgt.
Benna, Michael A., S/Sgt.
Bennett, Charles A., Lt.
Bennett, Earl B., S/Sgt.
Berchulski, Victor J., S/Sgt.
Berecz, Albert W., Lt.
Berg, Arnold M., T/Sgt.
Berg, Gordon H., Capt.
Berg, Lowell T., T/Sgt.
Berg, Maurice A., Lt.
Bergan, Bill J., Lt. (& OLC)
Berge, Olaf A., Lt.
Bergen, Luther, Lt.
Bergendahl, Robert E., S/Sgt.
Berger, Robert O., Lt.
Bergman, Dayrell A., T/Sgt.
Bergstrom, Don J., Lt.
Berinati, Leo G., Lt.
Beringer, Edward R., T/Sgt.
Berkeley, William R., Capt.
Berklund, Almon L., S/Sgt.
Besett, Bob, Lt.
Besse, Belden A., S/Sgt.
Bevan, John R. Lt.
Beven, William A., Lt.
Bevins, Beuford C., Lt.
Beyette, Horace H., Lt.
Bezak, Andrew, T/Sgt.
Bezek, Miroslov A., Sgt.
Biales, Albert, Lt.
Biddle, John C., Lt.
Biddle, Loran C., T/Sgt.
Bielinski, Edward A., Lt.
Bielega, Walter J., S/Sgt.
Bierman, Leonard B., Lt.
Bigler, Charles R., Lt.
Bill, Walter E., Lt.
Billington, Herbert M., Sgt.
Bilyeu, Emmett, S/Sgt.
Bingaman, John W., T/Sgt.
Bingham, Bill B., Lt.
Binius, Walter J., Lt.
Blacknis, John T., Lt.
Blackshear, Thomas E., F/O
Blackwelder, Bruce K., Lt.
Blagg, Sheldon N., S/Sgt.
Blain, Samuel B., Sgt.
Blair, Frederick O., Lt. (& OLC)
Blair, Hubert M., Lt.
Blair, Robert S., S/Sgt.
Blake, John E., Sgt.
Blakeley, Everett E., Capt.
Blancett, Lloyd D., T/Sgt.
Blanchard, Melvin R., S/Sgt.
Biand, William J., S/Sgt.
Blanding, Leon M., Lt.
Blaney, Fred E., Jr., Lt.
Blankinship, John J., Lt.
Blansit, Leslie G., Sgt.
Blansit, Roy H., T/Sgt.
Blare, George O., Lt.
Blasco, Henry J., Sgt.
Blaszczyk, Edward M., S/Sgt.
Blatchford, Samuel N., T/Sgt.
Blau, Louis C., Maj.
Blauer, Dorsey A., T/Sgt.
Blazzard, Norman J., T/Sgt.
Bleakman, Melvin J., Lt.
Blomquist, Oscar M., Maj.
Bloodsworth, Robert E., S/Sgt.
Bloom, John P., Jr., S/Sgt.
Bloomer, Joseph A., Jr., Capt.
Bloomfield, Stewart M., T/Sgt.
Blount, Wilbourne E., Lt.
Blue, John C., S/Sgt.
Blue, Wayne L., Lt.
Blum, Allen H., Lt.
Blum, Franklin A., T/Sgt.
Blumenfeld, Charles A., Lt.
Boals, Charles C., S/Sgt.
Boardman, William D., T/Sgt. (& 2 OLC)
Boatman, Clifford O., Sgt.
Boatwright, Lewellyn T., Jr., Maj.
Bobbett, James A., S/Sgt.
Bock, Frederick C., Lt.
Bockman, Clarence W., T/Sgt.
Borne, Irvin J., Lt. (& 2 OLC)
Bornschein, Wilbur L., S/Sgt.
Borowski, Stanley, Lt.
Borsodi, Frederic A., Capt.
Bos, William H., S/Sgt.
Bosh, Jay R., Sgt.
Bosquet, Donald H., Pvt.
Bost, Murray D., Lt.
Bostaph, Anthony W., S/Sgt.
Bostick, George F., S/Sgt.
Boswell, Irving W., Capt.
Boswell, Joe S., F/O
Bothwell, Wells M., T/Sgt.
Bottarini, Joseph E., T/Sgt.
Boucher, Robert N., Lt.
Boufford, Robert A., T/Sgt.
Bouquet, Arthur W., Jr., Lt.
Bourgeois, Clarence P., S/Sgt.
Bourne, Clifton S., S/Sgt.
Boutelle, Winston E., Lt.
Boutross, Ferris T., Cpl.
Bowcock, Robert, Lt.
Bowden, Edward F., S/Sgt. (& OLC)
Bowell, Douglas O., S/Sgt.
Bowen, Ferrell L., Maj.
*Bowen, Henry, Sgt.
Bowen, Lawrence W., T/Sgt.
Bowen, Lewis L., Lt.
Bower, James E., Lt.
Brannan, Richard P., Lt. (& 2 OLC)
Brannon, Ted, Lt.
Branstetter, Lyle R., Lt.
Branstetter, Ralph A., T/Sgt.
Brassell, Bobby G., Sgt.
Bratton, Andrew J., Jr., Capt.
Brauer, Karl H., Lt.
Braun, Hilbert W., S/Sgt.
Brauns, Robert L., Lt.
Braverman, Myron B., Lt.
Bray, James A., Lt.
Bray, Robert E., Lt.
Brazon, Walter, T/Sgt.
Breakie, Robert J., S/Sgt.
Brecht, Harold M., Capt. (& OLC)
Breedlove, Paul L., Jr., S/Sgt.
Breindel, George J., Lt.
Breitschopf, Kenneth J., Capt.
Brendemoen, Cy H., T/Sgt.
Brenna, Marvin O., S/Sgt.
Brennan, David T., Lt.
Brennan, Joseph K., Lt.
Brennan, Joseph X., Lt.
Brennan, Robert J., S/Sgt.
Brenner, Francis E., Maj.
Brewer, Benjamin C., Lt.
Brewer, Charles D., Lt.
Brewer, Frank G., Jr., T/Sgt.
Brewer, James E., Lt.
Brewer, Samuel J., Capt.
Breyfogle, Howard V., S/Sgt.

(Continued on Next Page)

* Posthumous

Roll of Honor

A MONTHLY RECORD OF DECORATIONS AWARDED TO PERSONNEL OF THE ARMY AIR FORCES

(Continued from Preceding Page)

Britton, John F., Capt.
Britton, Marion P., Sgt.
Britts, Bernard A., Lt.
Brode, Nelson B., S/Sgt.
Broemmelsiek, Eugene V., Lt.
Brokob, Alvin H., S/Sgt.
Broman, Eldon J., Lt.
Brookfield, Donald S., Lt.
Brookman, Gerald W., S/Sgt.
Brooks, James P., Sgt. (& OLC)
Brooks, John P., Capt. (& OLC)
Brooks, Norman E., Lt.
Brooks, Raymond E., Lt.
Brooks, Thomas P., Capt.
Broome, William C., Lt.
Brophy, Edward G., Lt.
Brorby, Donald J., Cpl.
Broschart, Joseph F., S/Sgt.
Brosic, Joseph A., Jr., S/Sgt.
Bretzman, Elwood H., S/Sgt.
Brown, Billy S., T/Sgt.
Brown, Charles W., S/Sgt.
Brown, Chester L., Lt.
Brown, Clarence A., Sgt.
Brown, Cleve M., Jr., Lt.
Brown, Clifford, T/Sgt.
Brown, David O., S/Sgt.
Brown, Dean L., S/Sgt.
Brown, Eager W., Jr., Lt.
Bryan, Donald W., T/Sgt.
Bryan, James N., Capt.
Bryan, Merle G., Lt.
Bryan, Robert A., Lt.
Bryant, Byron C., Lt.
Bryant, Donald D., Lt.
Bryant, John H., M/Sgt.
Bryant, John P., Lt.
Bryson, Robert E., T/Sgt.
Bryson, William C., Capt.
Brzozowy, Adolph Edwin, S/Sgt.
Bucey, Lester E., T/Sgt.
Buchanan, Beaufort A., T/Sgt.
Buchanan, Frank H., Capt.
Buchanan, Jim Bright, Lt. (& OLC)
Buchanan, John S., Lt.
Budarek, John J., Sgt.
Budde, Joseph M., Sgt.
Budesa, Paul G., Lt.
Bugyie, Steve F., S/Sgt.
Buk, Ross H., Lt.
Bukovich, Joseph, Jr., T/Sgt.
Bulgarelli, Henry J., Lt.
Bull, Henry E., T/Sgt.
Bull, John E., S/Sgt.
Bullington, Ray W., S/Sgt.
Bullis, George J., S/Sgt.
Bullis, Robert E., Lt.
Bullock, Carl, S/Sgt.
Bumala, Eino A., S/Sgt.
Bumgarner, Willis C., Capt. (& OLC)
Bunch, Melvin E., Lt.
Bundick, Paul S., Lt.
Bunke, Harvey C., Cpl.
Bunker, Richard T., Lt.
Bunte, Allen F., Lt.
Bunting, Frank E., T/Sgt.
Burrell, Harry R., Capt. (& OLC)
Burrell, Robert M., Lt.
Burtch, William P., S/Sgt.
Burtis, John R., Lt.
Burton, Gerald C., S/Sgt.
Burton, William H., T/Sgt.
Busby, Robert K., T/Sgt.
Busch, Francis, Sgt.
Bush, Clinton A., F/O
Bush, Walter L., Lt.
Butchartt, James A., Lt.
Butcher, Grant L., S/Sgt.
Butler, Daniel A., S/Sgt.
Butler, Donald H., Lt.
Butler, Gilbert E., Lt. (& OLC)
Butler, James E., S/Sgt.
Butler, Robert H., Lt.
Butler, Walter S., Lt.
Butler, William E., T/Sgt. (& 2 OLC)
Butt, Byron K., Capt.
Butterfield, Clyde C., T/Sgt.
Buxton, Grover H., Lt. (& OLC)
Byars, Donald N., Capt.
Byas, Tucker W., Sgt. (& OLC)
Bycott, Andrew T., Lt.
Byers, John F., S/Sgt.
Byrd, B. Z., T/Sgt.
Byrd, Bacchus B., Jr., Lt.
Byrd, James F., Sgt.
Byrd, William J., Lt.
Byrne, Joseph E., Lt.
Byrne, Robert J., Lt.
Byrne, Thomas I., Sgt. (& OLC)
Byrnes, Thomas A., S/Sgt.
Cabral, William M., Lt.
Cady, Chester C., S/Sgt.
Caffrey, William F., Sgt.
Cage, Rueben W., Lt.
Cagle, Henderson, Lt.
Cahill, Harold K., Lt.
Cahill, James E., Sgt.
Cahill, Thomas J., Lt.
Cahow, William A., Lt.
Caillier, James E., T/Sgt. (& OLC)
Cain, Orville R., T/Sgt.
Cain, Thomas G., Lt.
Cain, Wilson W., S/Sgt. (& OLC)
Caivano, Albert F., Sgt.
Cakert, Thomas F. X., Lt.
Calame, Harvey W., Cpl.
Calcaterra, Angelo E., M/Sgt.
Calderbank, John J. B., Maj.
Calderon, Moses R., M/Sgt.
Caldwell, Francis E., Sgt.
Caldwell, Henry J., S/Sgt.
Caldwell, William J., S/Sgt.
Calhoun, Robert B., S/Sgt.
Calitri, Louis J., T/Sgt.
Calla, John W., S/Sgt.
Callahan, Curtis W., T/Sgt.
Callahan, Hayes B., S/Sgt.
Callahan, Robert E., T/Sgt.
Callahan, Robert E., Lt.
Callender, Alvin D., Lt.
Callihan, Marvin O., Maj.
Calvert, Edward H., Lt.
Campbell, David A., Maj.
Campbell, David R., F/O
Campbell, Donald J., Lt. (& OLC)
Campbell, George T., S/Sgt. (& OLC)
Campbell, William J., Lt.
Campbell, Woodrow R., Lt.
Candy, William R., Lt.
Caney, Albert L., Capt.
Canfield, Ivan, Lt.
Canham, Arthur Eldridge, Capt.
Canham, Dick M., F/O
Canipe, Garland G., S/Sgt.
Canning, Douglas S., Lt.
Cannon, Charles J., T/Sgt.
Cannon, Clyde C., Lt.
Cannon, Lester R., S/Sgt.
Canterbury, Arnal J., Jr., S/Sgt.
Cantrell, Jack R., S/Sgt.
Capen, Paul N., Sgt.
Capener, Vern K., Capt.
Caporusso, Louis, T/Sgt.
Cappo, John B., Lt.
Caprarotta, Francis, T/Sgt.
Capuano, Frank G., T/Sgt.
Carr, Edwin F., Jr., S/Sgt.
Carr, Joseph P., Lt.
Carr, Lee D., Lt.
Carr, Roy L., Capt.
Carrel, Ralph L., S/Sgt.
Carroll, James G., Capt.
Cartwright, Roger A., Lt.
Casey, Francis V., Lt.
Castle, Frederick W., Col.
Caton, Edward H., S/Sgt.
Cavaness, Sanford, Cpl.
Chadwick, Wesley M., Sgt. (& OLC)
Chapel, Norva C., Sgt.
Chapman, John H., S/Sgt.
Chapman, Thomas J., M/Sgt.
Chase, Levi R., Jr., Maj. (& 2 OLC)
Check, Raymond J., Capt.
Chin, Wai S., Sgt.
Christensen, Horace H., Lt.
Christmas, Frederick A., S/Sgt.
Christopherson, Robert L., T/Sgt.
Chudoba, Edward J., Lt.
Cicon, Michael J., S/Sgt.
Claflin, Leigh A., S/Sgt.
Clancy, William E., Capt. (& OLC)
Clapp, William C., Lt.
Clapper, John W., Capt. (& 4 OLC)
Clark, Glenn W., Maj.
Clark, James A., Jr., Capt. (& OLC)
Clarke, Howard A., S/Sgt.
Classen, Thomas J., Maj. (& OLC)
Claxton, Arlie W., Lt.
Cleland, Carl E., S/Sgt. (& OLC)
Clemens, Barner F., S/Sgt.
Clements, Joseph B., Jr., Lt. (& OLC)
Clemmenson, Gerald O., S/Sgt.
Cleven, Gale Winston, Maj.
Clifford, Thomas A., F/O
Clifford, Wilbert L., S/Sgt.
Cluck, Clarence A., Sgt.
Clutter, Clyde M., Cpl.
Coburn, Bernard A., S/Sgt.
Cochran, Joseph W., Lt.
Cochran, Paul R., Lt.
Cody, Wathen F., T/Sgt.
Coe, Oscar M., Jr., Lt.
Coen, Oscar H., Maj.
Cohen, Schiller, Sgt.
Cole, Robert W., Sgt.
Coleman, Elmer L., M/Sgt.
Coleman, Richard C., Lt.
Cook, Maxworth, S/Sgt.
Cook, Vernon S., S/Sgt.
Cook, Walter N., Jr., Cpl.
Cool, Paul E., Capt.
Coomes, Clarence S., S/Sgt.
Cooper, Kenneth A., S/Sgt.
Couch, Robert E., S/Sgt.
Counts, Charles M., S/Sgt.
Coss, Walter L., Capt.
Courtney, Robert E., Lt.
Couture, Romeo S., Lt.
Cowherd, Ford C., S/Sgt.
Cox, Leonard L., Capt.
Cox, Roland B., S/Sgt.
Craig, James M., S/Sgt.
Crandall, Donald O., S/Sgt. (& OLC)
Crandall, Arthur L., S/Sgt.
Crawford, John D., Lt.
Crawford, William, Jr., Lt.
Crumley, Jim M., S/Sgt.
Crump, Harry C., Lt.
Cummings, Ralph W., Lt.
Cunningham, Aloysius G., S/Sgt.
Cutshell, Ernest J., S/Sgt.
D'Adamo, Domenick, Lt.
Darlington, Julian T., Lt.
Davies, George E., S/Sgt.
Davis, Melvin H., T/Sgt.
Davis, Thomas E., T/Sgt.
Dayberry, John T., T/Sgt.
Dean, John A., Lt.
Debusk, William R., Lt.
Dee, John T., Sgt.
Deem, Harry G., Jr., Cpl.
Demas, Merril E., S/Sgt.
Denton, William J., Lt.
Detreville, Paul C., Lt.
Dickey, Raymond N., S/Sgt.
Dickson, Howard L., Lt.
Dieterle, Jack W., Lt.
Dillman, Plase, T/Sgt.
Ditullio, John A., S/Sgt.
Dodd, Herschel W., S/Sgt.
Doerner, William F., S/Sgt.
Domke, Carl A., T/Sgt.
Driver, Robert R., S/Sgt.
Duden, William T., Capt.
Dzadyk, John, T/Sgt.
Easterling, Silas W., T/Sgt.
Edwards, James B., Cpl.
Ellison, Coy B., Lt.
Ely, Seth G., S/Sgt. (& OLC)
Emmons, John W., Capt.
Engdahl, Eugene W., S/Sgt.
Erdely, Julius, S/Sgt.
Eshelman, Paul F., T/Sgt. (& OLC)
Fabiny, Andrew T., Lt.
Fagan, Frederick G., T/Sgt.
Farnam, John K., T/Sgt.
Ferguson, Earl F., Lt.
Fileger, John B., S/Sgt.
Fisher, Louis G., T/Sgt.
Fleming, Lemuel D., S/Sgt.
Flesch, Anthony W., Lt.
Flister, Henry O., S/Sgt.
Fogel, Ernest W., Lt.
Ford, Herrel E., Lt.
Foster, Leslie J., S/Sgt.
Fowler, Lloyd T., T/Sgt.
Foy, Roy J., S/Sgt.
Franklin, Albert D., T/Sgt.
Franklin, Russell A., Lt.
Franks, Worthington A., Lt. (& OLC)
Fravega, Anthony T., T/Sgt.
Freeman, Albert V., Lt. (& OLC)
Freeman, Billie L., S/Sgt.
Fretwell, Lloyd G., Lt.
Friberg, Wayne V., Lt.
Fribley, Donald E., F/O
Fulfer, George W., T/Sgt. (& OLC)
Fussi, Joseph, S/Sgt.
Galasso, Anthony L., T/Sgt.
Galinus, John J., S/Sgt.
Gallagher, Raymond T., Lt.
Gambrill, Jean W., Lt.
Garret, Charles E., T/Sgt.
Gearhart, Bill G., T/Sgt.
Gebhard, Norbert N., Lt.
Geith, Russell, S/Sgt.
Gentry, Homer S., F/O
George, Ernest A., S/Sgt.
Germann, Oliver R., S/Sgt.
Geron, Alva J., Lt.
Gerrits, James F., Lt.
Gibbey, Gola G., S/Sgt.
Gibson, Howard, S/Sgt.
Gill, Theodore N., III, Lt.
Girard, Louis V., Lt.
Gluck, Edwin L., Lt.
Gomillion, Elton L., T/Sgt.
Good, Arnold N., Lt.
Goodall, Edward M., S/Sgt.
Gormey, John H., S/Sgt.
Gotts, Howard F., Sgt.
Green, Alan J., Lt.
Green, Allen H., Lt.
Gregory, Cornelius K., T/Sgt.
Greybill, Robert C., Lt.
Grimes, Donald J., T/Sgt. (& OLC)
Grimes, Eugene L., S/Sgt.
Haydek, Edward L., S/Sgt. (& OLC)
Hamilton, Frank M., S/Sgt.
Harms, Roy C., Lt.
Harth, William H., Jr., Lt.
Havens, Leycester D., S/Sgt.
Havens, William S., Lt.
Hearne, Allie T., Jr., S/Sgt.
Henderson, Charlie P., Jr., Lt.
Hickerson, Glenn C., S/Sgt.
Hicks, Doyle, Capt.
Hill, James E., Jr., Lt.
Holbrook, Melvin B., S/Sgt.
Holloway, Lloyd E., Jr., Lt. (& OLC)
Homes, Walter T., Jr., Capt.
Hughes, George T., Lt.
Hughes, William D., Lt.
Hulsey, Dale G., T/Sgt.
Hunn, Spencer S., Lt.
Huntley, Beverly S., Lt.
Hurd, Richard F., Lt.
Hyde, Robert H., Lt.
Ipher, Claude H., Lt.
Isaacson, William D., S/Sgt. (& OLC)
Jackson, Barney, Lt.
Jacot, Paul F., T/Sgt.
James, Harold L., Lt.
Janic, Edmund F., Lt. (& OLC)
Jenkins, Donald, Lt.
Jennings, Burnett, T/Sgt.
Jett, Joseph W., T/Sgt.
Johns, Russell, S/Sgt.
Johnson, Donald G., Lt.
Johnson, Elijah D., T/Sgt.
Johnson, John F., S/Sgt.
Johnston, Turner Y., T/Sgt.
Johnston, Woodrow W., T/Sgt.
Jordan, William G., T/Sgt.
Judy, Robert J., Sgt.
Just, Frank, T/Sgt.
Keany, Frank W., Jr., Lt.
Kelly, Fay L., T/Sgt.
Killian, Clinton H., Lt.
Kirkland, Doyle L., S/Sgt.
Kish, Julius A., S/Sgt.
Klingle, Henry A., T/Sgt.
Kneisl, William A., S/Sgt.
Knotts, Harold G., T/Sgt.
Koon, Loren J., F/O
Korger, Harold F., Lt. (& OLC)
Kozak, Frank B., S/Sgt. (& OLC)
Kraft, John E., Lt.
Krause, William G., F/O
Kuhn, Byron G., Sgt.
Labranche, Joseph W., Sgt.
Lacombe, Raymond J., F/O
Lalonde, Howard J., Lt.
Laskowski, Thomas A., Jr., T/Sgt.
Laudig, Harold J., Lt.
Lawson, Harry C., S/Sgt.
Leadingham, Arthur, T/Sgt.
League, Miles R., Lt.
Leard, Frederick A., T/Sgt. (& OLC)
Leimbach, Bernard E., Lt. (& OLC)
Lemmons, Wallace E., S/Sgt.
Lesho, Michael J., S/Sgt.
Levine, Robert J., S/Sgt.
Lewis, David M., Lt.
Lewis, Farley R., S/Sgt.
Lewis, Jack M., Lt.
Light, Edwin C., T/Sgt.
Lindsey, James R., F/O
Lindsey, Robert C., Sgt.
Little, William K., Lt.
Lockhart, John O., Lt.
Long, Winfield V., S/Sgt.
Long, Worthy A., Lt.
Longnecker, Russell D., F/O
Lower, Max W., T/Sgt. (& OLC)
Lubin, Alex, T/Sgt.
Lucas, Bernard R., T/Sgt.
Lucas, Howard M., S/Sgt.
McCracken, Roy B., S/Sgt.
McCrary, Troy O., S/Sgt.
McCune, Joseph J., S/Sgt.
McDonald, Olin K., Lt.
McDonnell, Martin J., T/Sgt.
McGahee, James H., Lt.
McGowan, Frank J., S/Sgt.
McGraw, John J., Lt.
McGreer, Robert E., Pvt.
McKee, Richard J., T/Sgt.
McKee, Warren C., S/Sgt.
McMahon, Lester A., S/Sgt.
McWhirter, Oscar F., T/Sgt.
Machos, Harry J., T/Sgt.
Mack, Thomas E., S/Sgt.
Mann, Dale B., T/Sgt.
Marley, Wayne, S/Sgt.
Marquis, James E., Lt.
Marrah, James H., Lt.
Martens, Edward W., S/Sgt.
Martin, George P., Lt.
Martin, Leslie W., T/Sgt.
Martin, Roy G., Lt.
Maruszewski, Frank A., S/Sgt.
Mash, Alfred A., S/Sgt.
Mason, Robert E., Lt. (& OLC)
Mathers, Mark J., Jr., Lt. (& OLC)
Matthews, Essman G., T/Sgt.
Maury, Dale W., S/Sgt.
Mayer, Vernon E., S/Sgt.
Michener, Byran R., Lt.
Mickey, Marvin R., Sgt.
Middleton, Wayne H., Lt.
Millar, Philip, Lt.
Miller, Clyde E., Lt.
Miller, Gilbert, S/Sgt.
Miller, James W., S/Sgt.
Miller, Paul M., S/Sgt.
Miller, Richard T., Lt.
Millward, Warren F., S/Sgt.
Moedinger, Harry E., Lt.
Molina, Charles R., S/Sgt.
Moore, Chester W., S/Sgt.
Moran, Homer L., Lt.
Mordovancy, Andrew, F/O
Morgan, James E., S/Sgt.
Morgan, Raymond D., S/Sgt.
Morgan, John W., T/Sgt.
Morris, John P., S/Sgt.
Morrison, Kelly L., S/Sgt.
Musser, Monroe F., T/Sgt.
Nalipa, Stanley G., Sgt.
Nash, Robert D., Lt.
Nathe, Raymond J., Lt.
Naum, Albert C., Lt.
Neeper, Loy L., T/Sgt.
Nelson, Hugh D., T/Sgt. (& OLC)
Nelson, Milo G., S/Sgt.
Nelson, Philip E., Lt.
Nemeth, Frank, S/Sgt.
Nessler, William R., S/Sgt.
Newbold, William P., Lt.
Nicholson, Robert G., Lt.
Nix, Allen L., T/Sgt.
Norman, Lawrence C., Lt.
Norris, Frank A., T/Sgt. (& OLC)
Norton, Donald A., Lt.
Norwood, Pies W., Jr., T/Sgt.
Oakley, Warren W., Lt.
Oaks, John M., S/Sgt.
O'Connor, John E., S/Sgt.
O'Hara, John P., S/Sgt.
Opp, Harry C., T/Sgt.
Opsata, Andrew W., Lt.
Orr, Daniel B., Lt.
Orr, Warren A., T/Sgt.
Packer, Paul W., F/O
Packer, Stanley L., S/Sgt. (& OLC)
Page, Russell B., T/Sgt.
Pakos, Anthony R., Lt.
Park, John C., Lt.
Parker, Oscie K., Lt. (& OLC)
Parramore, George H., S/Sgt.
Patch, Dwight D., Lt.
Peidl, Anthony J., S/Sgt.
Pemberton, Leon D., T/Sgt.
Perkins, Ralph F., Jr., Lt.
Peterieus, Arthur W., S/Sgt.
Peterson, Robert C., Lt.
Petty, Jack, S/Sgt.
Phifer, Forrest H., Lt.
Phillips, Elvin L., Sgt.
Pimm, William G., S/Sgt.
Pinson, J. C., T/Sgt.
Pitcovick, John, T/Sgt.
Potvin, Arthur E., S/Sgt.
Poulson, Ernest L., Lt.
Preite, Louis, S/Sgt.
Propst, John, S/Sgt.
Quaglino, Louis R., F/O
Quinn, Joseph T., T/Sgt. (& OLC)
Rackley, Leo W., T/Sgt.
Ramey, John T., S/Sgt.
Randall, Fred D., T/Sgt.
Randles, Ward M., T/Sgt.
Rangel, Manuel R., S/Sgt.
Rantala, Archibald J., Capt. (& OLC)
Ray, Thomas C., S/Sgt.
Reback, Sanford A., Lt.
Reed, Jack, S/Sgt.
Reed, Jack J., T/Sgt.
Reed, Ralph A., S/Sgt.
Reese, William L., Jr., Lt.
Reeves, Ray P., T/Sgt.
Reid, James W., Lt.
Reischl, Herb J., S/Sgt.
Rice, Earl D., S/Sgt. (& OLC)
Richardson, Ralph E., T/Sgt.
Riff, Bill M., S/Sgt.
Riffle, Clell B., T/Sgt.
Rifkin, Harry, Sgt.
Ritchie, John A., S/Sgt.
Roach, Jack M., Lt.
Robbins, Charles D., S/Sgt.
Rockinson, Alexander P., T/Sgt.
Ronsberg, Lester H., Lt.
Root, Carl F., Lt. (& OLC)
Rose, James E., S/Sgt.
Rose, Virgil, F/O
Ross, Jack B., T/Sgt.
Ross, John R., S/Sgt.
Rossi, Alfred P., T/Sgt.
Rothrock, Clarence H., Sgt.
Rowland, Daniel W., S/Sgt.
Rubin, Edward J., S/Sgt.
Rudell, John P., S/Sgt.
Ruecroft, Richard C., Lt.
Russ, John C., T/Sgt.
Russek, Frederick P., T/Sgt. (& OLC)
Saladiak, John, F/O
Sandish, Conrad A., S/Sgt.
Savage, Robert S., S/Sgt.
Savettiere, Anthony J., S/Sgt.
Scarlett, Theodore B., Lt.
Schappert, Thomas F., Sgt.
Schellinger, Robert W., Lt.
Schermurhorn, William, H., S/Sgt.
Schettler, William J., T/Sgt.
Schiffmacher, William W., Jr., Sgt.
Schultz, Robert P., Sgt.
Schuster, Harold L., S/Sgt.
Seigfeldt, Herman J., S/Sgt.
Selvidge, William M., Lt.
Senff, Robert J., Lt.
Sestina, Ernest A., S/Sgt.
Sevick, Stephen F., T/Sgt.
Shaffer, Albert L., S/Sgt.
Shannon, Eunice M., Lt.
Sharp, Leo, S/Sgt.
Shay, Anel B., Jr., Lt.
Shufritz, John, T/Sgt.
Sivley, William R., T/Sgt.
Slade, Robert W., M/Sgt.
Sloss, Richard N., Lt.
Slough, Frank D., Lt.
Smith, Cosby M., S/Sgt.
Smith, Kenneth W., T/Sgt.
Smith, Lavelle, S/Sgt.
Smith, Nick B., S/Sgt.
Smith, Robert M., M/Sgt.
Smithdeal, Edward O., Jr., Lt.
Snead, Harry R., Jr., T/Sgt.
Snow, Kenneth F., Lt.
Snyder, Clay E., S/Sgt.
Spencer, Eugene P., S/Sgt.
Spencer, Lyle A., Capt. (& OLC)
Spivey, Joseph B., Jr., T/Sgt.
Sroubek, Pravdomil, Sgt.
Staehle, John F., Lt. (& OLC)
Stafford, Morton O., Jr., S/Sgt. (& OLC)
Stallings, John B., Lt.
Starr, Charles L., F/O
Stevens, Gordon S., Lt.
Stewart, Theodore C., Lt. (& OLC)
Stewart, Walter T., Lt.
Stout, William B., T/Sgt.
Stout, William W., T/Sgt.
Stutling, Eldon R., Lt. (& OLC)
Sunderland, Hubert W., T/Sgt.
Sundstrom, Richard C., Lt.
Supiano, Boyden, Lt.
Suponcic, Frank J., S/Sgt.
Swafford, Jack L., S/Sgt. (& OLC)
Sykes, William W., Lt.
Szaras, Marion J., S/Sgt.
Szczepanski, Stanley F., S/Sgt.
Talas, Ralph L., Lt.
Theis, Robert, Lt.
Thomas, Raymond L., S/Sgt.
Thompson, Arthur W., Lt.
Thompson, Harold M., T/Sgt.
Thompson, Ralph P., Capt.
Tolleson, James F., Lt.
Tomashosky, Joseph, Lt.
Tomlinson, Eugene P., T/Sgt.
Toth, Andrew S., T/Sgt.
Toth, James J., T/Sgt.
Townley, Warren T., S/Sgt.
Townsend, Herman E., S/Sgt.
Traudt, Bernard G., S/Sgt.
Treichler, William E., T/Sgt.
Trick, Michael J., S/Sgt. (& OLC)
Trumbley, Albert F., S/Sgt.

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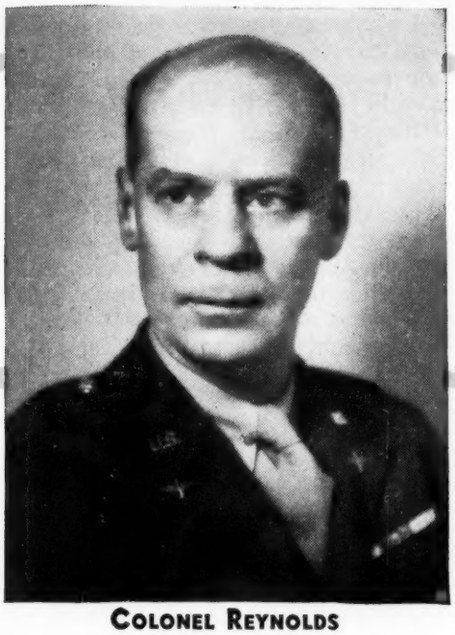


COLONEL REYNOLDS

Can You Keep a Secret?

By Col. H. G. Reynolds

THE AIR PROVOST MARSHAL

In its capacity as our security agency, the Office of the Air Provost Marshal must depend on every man in the AAF for the successful completion of its mission.

IN a card game, a good hand isn't worth much if a crafty opponent knows what you're holding. Being able to anticipate your plays, he not only can thwart your scheme of action but can take full advantage of your slightest vulnerability.

Similarly in warfare, in which the elements of timing, deception and surprise are so important, the superiority of a fighting organization's strategy and physical assets normally is of little avail unless plans for operations and equipment are kept secret from the enemy.

As the AAF's mastery of the skies becomes more firmly established with every new day of successful combat abroad and increased production at home, the Axis knows it cannot hope to match us plane for plane and attack for attack. It realizes that its only hope for delaying total air defeat lies in knowing what next to expect from the AAF and in turning that information to advantage.

Helping to block the enemy's desperate design is the AAF's own security agency —the Office of the Air Provost Marshal. Although many other important responsibilities, such as the recruitment, training and assignment of military police and guard squadrons, are entrusted to this office by General Arnold, safeguarding AAF secret and confidential information on the home front is today its most vital job.

Our task is a most difficult one because the AAF must function under conditions that permit valuable secrets to be constantly in danger of disclosure unless extreme measures of precaution are taken.

No other branch of the service has so much classified technical equipment or such trying circumstances under which to protect it. Nor do the operations of any other branch require the tremendous amount of classified documentary material that is continually being exchanged by the various Army Air Forces headquarters.

Complicating our problem is the fact that we must cope with a hidden enemy.

In aerial or ground warfare, the foe is easily identified but the enemy agent may be someone working in a vital job under the guise of U. S. citizenship.

The resourcefulness of enemy intelligence must not be underestimated. For years both Germany and Japan have operated espionage schools which teach a science advanced far beyond the Mata Hari stage of the last war. Students chosen for their base cunning have majored in the art of intrigue under the tutelage of shrewd masters.

As defeat of the Axis draws nearer, the attempts of these highly trained spies, saboteurs and subverters to detour the Allied march to victory can be expected to be increased. Only through a well organized system of education, inspection and police protection can we expect to combat the enemy fifth column at every turn.

AAF station commanders enforce local security with the advice and assistance of the Air Provost Marshal. The latter, in the exercise of staff supervision, assigns officers to make periodic inspections and surveys of the security situation at all AAF installations in the United States.

THERE is every reason to believe that all AAF personnel are genuinely loyal and trustworthy and that none would knowingly disclose military information to any person not authorized to possess it. What the Office of the Air Provost Marshal must constantly guard and preach against, however, is carelessness on the part of AAF officers, enlisted men and civilian personnel.

Leaks of information, which easily could lead to the compromise of military secrets, continue to occur within the AAF. Among instances of security violation handled by the Office of the Air Provost Marshal are:

(1) Failure to lock safes.

(2) Leaving secret and confidential papers in desks and in file trays after normal working hours.

(3) Failure of flying personnel to safeguard secret codes and other registered documents entrusted to their care.

(4) Careless talk in public places and in homes concerning projected operations and movement of forces and equipment.

(5) Careless discarding of memoranda on classified subjects.

(6) Forwarding of unclassified letters and dispatches which contain both the code and geographical names of places.

(7) Improper classification of papers and failure to show the authority for the classification of correspondence marked "Secret."

(8) Efforts of officers to convey to their families in private code classified information regarding prospective movements and locations in a theatre of operations.

(9) Discussion of secret and confidential matters by telephone.

(10) Failure to report transfer of registered documents.

(11) Furnishing classified information without investigating the right of the requester to receive it.

(12) Mailing of classified correspondence in single envelopes.

(13) Using other than registered mail for secret and confidential correspondence.

(14) Marking the outer envelope as well as the inner envelope "Secret" or "Confidential" in transmitting classified mail.

(15) Sending messages from plane to operations relative to important persons traveling by air.

(16) Attempts to pass customs and AAF certifying (censorship) officers with classified documents, personal letters, diaries, photographs of overseas operations, etc.

(17) Improper handling and burning of classified waste.

Enforcement of the security program does not end within the AAF but extends to private industry producing AAF equipment.

While the primary responsibility for security at such industrial plants rests with private management, the Office of the Air Provost Marshal exercises close supervision to insure that adequate protection is provided. Technical improvements in AAF equipment are being made so rapidly that the enemy would go to any lengths to gain access to factories which are turning out fighting planes and component parts.

Civilian guards at the plants are made members of the auxiliary military police, which functions under the direction of the Air Provost Marshal. They are given necessary training and are required to maintain prescribed standards of efficiency.

To insure that production flows uninterruptedly, the Air Provost Marshal concerns himself with the health, safety and morale of plant employes and the conditions under which they work.

Employment of aliens and alleged subversives as it affects the AAF is another problem. Through representation by officers of his staff, the Air Provost Marshal participates in the sessions of the Industrial Review Board of the Provost Marshal General's Office and the Japanese-American Joint Board.

The first-named body reviews the appeals of aliens and alleged subversives who have been suspended from or denied employment by plants engaged in classified war production contracts. It also reviews the appeals of persons who have been suspended from or denied employment by the War Department as a result of investigations revealing subversive activity or associations questionable from a security standpoint.

The Japanese-American Joint Board makes recommendations to the War Relocation Authority concerning the granting of indefinite leave to American citizens of Japanese descent, reviews all cases of Japanese-American employment and also has the power to grant or deny applications for Civil Aeronautics Authority licenses.

While his supervision of security is limited to the continental United States, the Air Provost Marshal investigates cases such as the loss overseas of registered documents, filing his report with the theatre commander for action the latter may deem appropriate.

But the home front presents so many problems that only through the exercise of constant vigilance by AAF personnel and our teammates—the men and women employed in aircraft plants and allied industries—can our mission be accomplished successfully. Security must be the concern of each of us. ☆

WANTED . . .

as many readers as possible for THIS COPY OF AIR FORCE. Please don't take it out of circulation. Share the service journal with every man in your unit.

READ IT . . . PASS IT ON!

Wong and His Salvage Business

By Capt. Robert V. Guelich
AIR FORCE Overseas Staff

THE war has brought no more alien life than that of Americans who live as wandering nomads in China. Living off the land and making their own decisions, these men salvage the airplanes which crash in the far reaches of China.

Leader of this band is Lieut. C. K. Wong, a mechanical engineering student at the University of California before the war. Under his leadership, American salvage men have learned to make their way and while the lieutenant is slow to pass them into his graduate ranks, he says the men are getting better all the time.

The success of their apprenticeship under Lieutenant Wong is indicated by their accomplishments last November and December when fifty crashed planes were gathered up from all parts of China, despite the rough terrain, Japanese patrols and the problems of transporting them hundreds of miles by sampan, coolie, burro, truck and railway to AAF repair bases. These planes are again flying combat missions against the Japs.

Lieutenant Wong, engineering officer at an advance AAF base and in charge of salvage work for all of eastern China, is a veteran of the American Volunteer Group which he joined in the early days of 1940. Because he understands Chinese people and knows the terrain of the country, the lieutenant has made an astounding record of recovering planes. Because he is an expert at salvage operations, he holds many commendations for his invaluable work. Of 28 planes reported as washouts in one area, Wong succeeded in geting 25 back into commission—a saving of over one million dollars worth of aircraft. This complicated task was accomplished by thirty AAF and sixteen Chinese mechanics under Lieut. Wong's command.

SALVAGE forays, sometimes deep into enemy-held territory, usually are made by small units of four Chinese and one American enlisted man. Taking their food and shelter where they find it and carrying but a few wrenches and light tools, these small bands wend their way over mountain trials, wade through rice paddies and struggle through dense jungle growth to find our crashed planes and airmen. From each wrecked plane they salvage all repairable parts and start their long and tedious journey back to base with the dismantled aircraft. Nothing seems impossible for these roving salvage experts.

Knowing the importance of fast work when Japanese troops are nearby, yet lacking adequate tools and facilities, salvage crews have dismantled a P-40 in a day and a half. Six days are usually required to tear down a P-38 and fourteen days for a B-25.

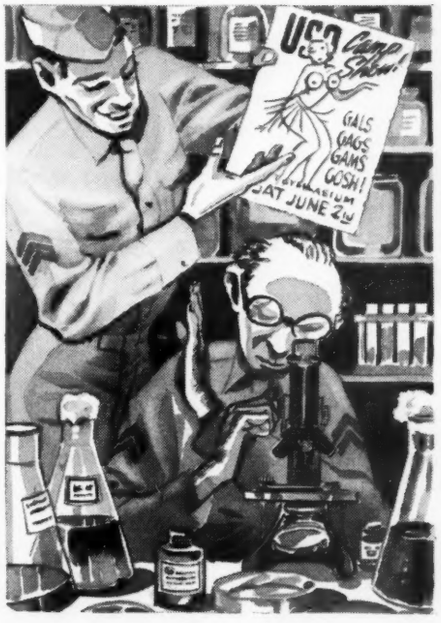
Lieutenant Wong's own career has been a daring and colorful one, even before his duty as a commissioned officer in the AAF began in June, 1942. He was the last of the AVGs to leave Burma, waiting until the last airplane had taken off to cross the mountain barrier into China. When all others had departed, Wong used his rifle to fire 6,000 drums of 100 octane gasoline and destroy fifteen P-40s which could not be evacuated for lack of repair parts and fifteen tons of medical supplies which had to be left behind. Then, climbing into a jeep, he headed for the mountains and safety on the Burma Road to escape the advancing Japanese.

Most GIs find it difficut to keep pace with him, particularly when traveling by foot and depending on Chinese food to sustain them. Early this year, however, one American soldier earned the outspoken admiration of Lieutenant Wong. "Staff Sgt. George deBois is one GI who can really take the travel in China," the salvage officer said. This tribute to deBois was well deserved, and other salvage crewmen have accepted the challenge of their Chinese commander. ☆

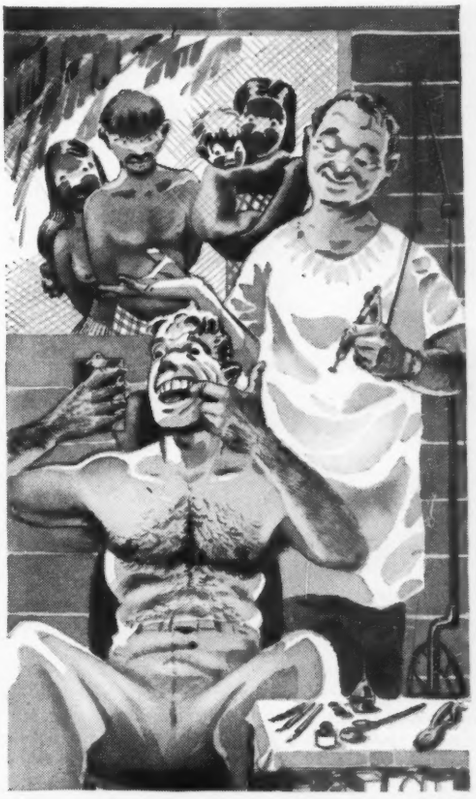
AAF MEDICS

By Lieut. Wm. T. Lent

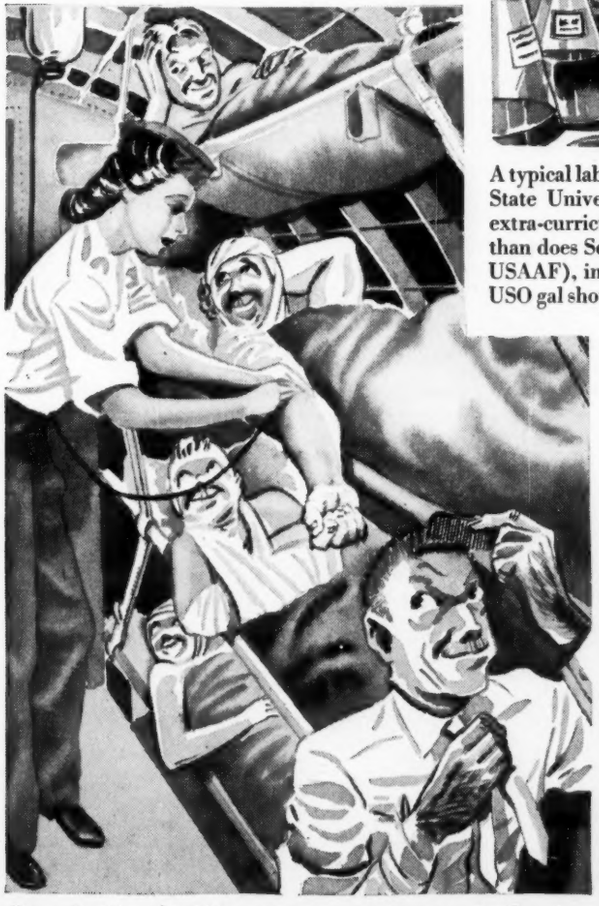
Like the chaplain, the flight surgeon really sweats it out with the men in his organization. At the moment, Major Lee is trying to overlook Colonel Darby's slight deficiency in the depth perception test in order to keep this veteran of 2,000 hours on assorted aircraft off the ground.



A typical lab scene. Corporal Champagne (B.S., State University) finds more interest in the extra-curricular study of his Penicillium mold than does Sergeant Walters (50,000 urinalyses, USAAF), in the announcement of the current USO gal show.



Gone are the days of the GI's mortal fear of the Army dentist. Today there is a well worn path leading to his door. At a south Pacific outpost, Private Reed inspects a beautiful inlay job done by Captain Jones with the aid of his portable Kit 60. In his spare moments, the captain will administer to the dental needs of the awe-struck natives.



Since the "Angels of Mercy" were put on flying status there has been a marked improvement in the mental attitude of patients being removed from forward combat areas. A sick man's spirits automatically rise at the touch of a kindly and competent feminine hand. Flight Nurse Nelson is the pin-up as well as patch-up girl of each troop transport she boards these days.

The forgotten member of the Medical Department is the sanitary officer. Captain Stalson's present state of dejection in this instance is caused by a bivouac maneuver over the mosquito control project. The squadron CO is doing his best to apologize for the havoc caused by foxholes, tree transplanting and truck tracks over the drainage ditches.

TRAINING AIDS
MOVIE REVIEW

LAND AND LIVE IN THE DESERT

A dramatic story of survival is unfolded in "Land and Live in the Desert," a new training film (TF 1-3346) produced by the AAF First Motion Picture Unit, Culver City, Calif.

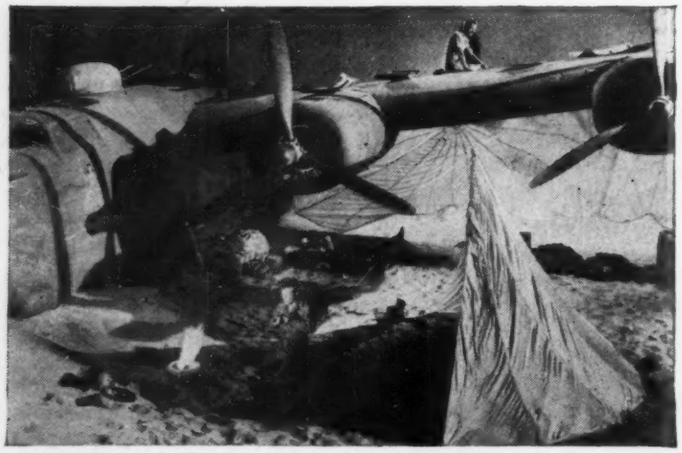
The film opens with the crash-landing of a B-24 in the desert. Injured crew members are given first aid, and an inventory is taken to determine the extent of equipment and supplies on hand which will aid in the survival of the personnel and facilitate their ultimate rescue. Plans are carefully worked out to stretch food and water stocks over the longest possible period.

Eventually, the pilot and one of his crew set out across the desert for assistance. Their procedure is depicted in detail in the film—how they carried along only the barest essentials, traveled by night to avoid the sun's heat, recorded their route with directional arrows and ultimately reached an oasis from which a rescue plane was directed to the scene of the crash. ☆

After B-24 crash-lands in desert, the ship's bombardier bandages the combat wounds of the navigator and the radio operator. Treatment of casualties is the primary consideration when a plane is forced down in wild territory and knowledge of first aid proves extremely valuable.

Gunners and bombardier unsuccessfuly attempt to repair the plane's radio, damaged during the landing. Had a portable transmitter been carried on the mission, help could be summoned speedily. Now rescue must depend upon the chance of a friendly plane's passing overhead.

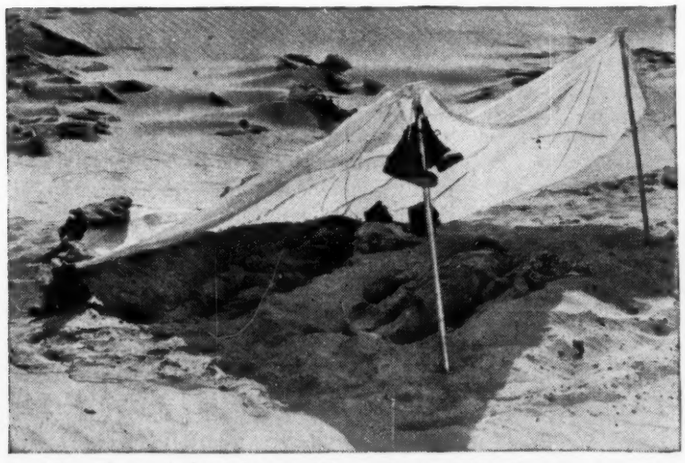
Uninjured members of crew decide at conference that best bet is for all to remain with plane and trust to luck. Pilot reads from the kit manual, designed to cover emergencies, and plans are made to ration scanty supplies of food and water over the longest possible period.



Plane's equipment is utilized to aid the crew's fight for survival. Ship's toilet is converted into a stove by filling it with sand and gasoline. Parachutes become awnings against the burning desert sun. Wings are scraped so sun's reflection may attract a rescue plane.

But as days pass and the situation becomes alarming, all agree that action must be taken. Determining from maps that the nearest oasis lies sixty miles distant, the pilot decides that he and one of the gunners will make the six-day trek across the desert to obtain help.

Carrying only barest essentials and wearing puttees improvised from parachute silk, the pilot and gunner are ready to depart. The pilot gives last minute instructions to remaining crew members on care of the wounded and on procedure for signals when rescue plane is heard.



Avoiding the sun's heat by traveling only at night, the pair rests during the daytime under a shelter constructed from parachute silk and pack frames, which serve also as walking staffs. Shoes are dried in sun to prolong their life. Water and food are consumed sparingly.

The expeditionists record their route with huge directional arrows, made of loose stones, so they may be located readily if rescue comes to the stranded crew before the journey is completed. But the oasis is reached and an RAF plane is sent to the site of the crash-landing.

When the engines of the British search plane are heard, the expectant Americans signal their exact location by lighting smoke fires and by shooting flares into the sky from a Very pistol. Cartridges for the pistol have been carefully preserved for this happy moment of rescue.

The Britishers revive the AAF men with food and drink before flying them to civilization. Assigned later to a new B-24, the crew profits by its lesson. On missions over desert terrain, it carries plenty of survival equipment — from canned fruit juice to portable transmitters.

AAF FIRST MOTION PICTURE UNIT

Culver City, California

WHERE TO GO

Information on the availability of training films and film strips, aircraft recognition materials, training devices and training publications may be obtained from the Chief, Training Aids Division, Army Air Forces, 1 Park Avenue, New York 16, N. Y., upon request through channels. AAF Regulation No. 50-19 explains fully the functions of the Training Aids Division.

HOLLANDIA A

A string of bombs from the first B-24s in a formation "walks" across the Jap airdrome at Hollandia, catching dozens of enemy bombers and fighters parked closely on the ground. The Japs must have seen AAF reconnaissance planes sizing up the target on previous occasions but they mistakenly assumed that Hollandia was beyond the range of bombers with fighter escort.

AIR blockade, as executed and perfected by the 5th Air Force, has been described by Col. Merian C. Cooper, chief of staff of the 5th's advance echelon, as "D to the 5th Power."

(1) Destroy the enemy's air power.
(2) Destroy his AA defenses.
(3) Destroy his airdromes so no more power can come in.
(4) Destroy the enemy's living quarters and areas of key personnel.
(5) Destroy all of his stores and installations.

These principles of air blockade were practiced on Wewak early in 1944. On thirteen out of fifteen days in March, the 5th Air Force threw everything it had at this target, going after the objectives in the order named. Eighty-nine enemy planes were destroyed in the air and more on the ground. After the final strike on March 25, Wewak was finished. On March 23 the Jap forces began evacuating Wewak and hiking through the back country, for his barge line had been severed by constant air patrols.

Between March 30 and April 16 the air blockade was extended to Hollandia. In seven strikes the 5th Air Force paved the way for the invasion party so thoroughly that the infantry illustrated one of General Kenney's prime maxims:

"One of the essential purposes of air power is to land troops with rifles on their backs and to have the enemy so thoroughly demolished that the rifles are kept there as long as possible."

In those seven giant attacks, the enemy's air strength which he had been building for weeks was wiped out as thoroughly as a janitor clearing a blackboard with a wet rag. Three hundred and fifty-two Jap planes were destroyed or badly damaged in the air and on the ground.

Contributing to the success of this operation was that most important of all military elements—surprise. At Hollandia surprise came from the "long-legged" P-38s. For months the enemy was led to believe that he was safe at Hollandia because we would not attack without fighter cover and we had no fighters that could fly that distance and fight.

There had been some night raids and some photo-reconnaissance. These were designed to make the enemy believe that he was safe. The P-38s were kept under wraps and were flown only as far as Wewak—just over 300 miles from the nearest base. All of this caused the enemy to become careless in dispersing his planes and setting up his ground defenses. He was encouraged to believe that any attempted landing would be made at Wewak.

On March 30 the heavy bombers struck in force. Escorted by more than their number of P-38s, this was the first time the fighters had ever been that far from their home base. Of 150 enemy fighters on the airdromes, 40 came up to intercept. They had to climb and they were disorganized. Half of them were destroyed by the Lightnings while the B-24s went about the job of carrying out their share of phase Number 1—destruction of the enemy's air power.

The bombers carried incendiary clusters. The 5th Air Force has found these effective against enemy airplanes on the ground when used by high-flying bombers. However, in this type of work, the low altitude bombers and attack bombers use 100-pound parafrags and parademos.

MEANWHILE, at Aitape the same process was going on at Tadji airdrome. It was being hit by B-25s with P-40s and P-47s as escort. In the days to come, Tadji, though smaller, was to be a carbon copy of Hollandia.

On March 31 the same planes went back in practically the same numbers for a second attack on the dispersal areas at Hollandia, Cyclops and Sentani airdromes. Approximately thirty enemy fighters intercepted. Almost half of them were shot down. As a result of the two days' strikes, 219 enemy airplanes were destroyed or damaged. We lost one P-38.

Surprise is to air attack what mustard is to a hot dog. You can do without it but it makes a big difference. Another surprise on April 3 broke the Japs' back at Hollandia. In addition to B-24s and B-25s, the A-20s came swarming over the enemy airdromes like locusts. Up to this time the Jap had no idea the attack bombers had such range. Now it was too late for them to do anything about it. The order of attack that day was first, heavies, then mediums, and then the attack bombers.

The first step of the air blockade was completed. The second began April 5 when the bombers went after the AA using 1,000-pound demolition bombs. They kept after this target, meanwhile overlapping in the remaining three phases as the AA faded. On April 3, 5, 8 and 12, phase number two was accomplished. The remaining three steps were achieved on April 5, 8, 12 and 16 generally by means of 500-pound demolition bombs. Weather immobilized the 5th Air Force planes on the other days. But so great was the damage at Hollandia that the enemy did not have the strength to make

A AND THE PRINCIPLES OF AIR BLOCKADE

By Capt. L. P. Bachmann
AIR FORCE Overseas Staff

Our operations against the enemy in the Southwest Pacific have resolved themselves into a 'D-to-the-5th-Power' routine, with surprise added for good measure.

repairs or materially change the schedule.

By April 16 the Japs' greatest remaining concentration at any one base south of the Equator—more than 300 planes—had been destroyed. This force was a potent factor, for it contained many long-range, fast bombers. But by the end of the seventh strike they were listed among the Jap planes demolished.

This total was composed of 68 fighters shot down during four diminishing interceptions and 284 planes destroyed on the ground. On the first day the enemy was caught by surprise. After that, even though he was ready, he was not anxious to do battle. Most of his aircraft were destroyed on March 30 and 31 and April 3. On April 12 the Jap made a final desperate stab with twenty fighters and lost eleven. That finished any interception.

From April 16 until April 22 the weather was bad. Our planes could make only short strikes. The 5th Air Force kept after the Tadji-Aitape area with the result that when a landing was made there our troops simply walked right in. Planes also kept the sea cleared of enemy shipping, so the retreating forces had to take to the back country. Meanwhile, the heavy bombers of the 13th Air Task Force under the command of Maj. Gen. St. Claire Streett pounded Woleai in the Carolines to prevent any enemy reconnaissance planes from this area coming down and spotting the Navy task force that was on its way.

THIS task force, the largest ever assembled in this area, went ashore on a front of almost 150 miles between Aitape, Hollandia and Tanahmerah Bay on April 22. This 500-mile hop, the distance from Saidor to Hollandia, is greater than the distance the whole Southwest Pacific forces had moved in two years.

Moving in high gear, the troops captured Tadji in 24 hours. In the landing farther north, two major beachheads were established, above and below Hollandia. The infantry raced to see which party would be first to the airdromes.

On April 25 a landslide on the only road cut the troops moving south from Tanahmerah Bay, from their supplies. They kept right on going; bombers of the 5th Air Force dropped food and supplies until the road was cleared.

Less than 100 hours after the Tadji occupation all three strips at Hollandia were captured. Enemy resistance was light and our losses very low. Our troops discovered Jap breakfasts waiting on the table. The Jap general apparently was literally and figuratively caught with his pants down for those garments were found in his special clothes press. He must have made an incongruous sight tearing through the jungle dressed as a

Ground forces on one of the Hollandia airdromes take a good look at the job of reconstruction they have ahead of them. The huge craters in the foreground and along the runway indicate the thoroughness with which the 5th Air Force softened up Hollandia for invasion with attacks on March 30 and 31. The shattered Jap planes in this photograph are but two of 219 destroyed in the two raids. This picture was taken on April 27 from a B-24 which had just dropped its cargo of supplies by parachute along the dispersal area and pocked runway.

general only from the waist up—a terrible loss of face.

The enemy followed their leader into the back country. As at Saidor, they attempted to march around our troops. We quickly consolidated our positions. While the air engineers got the fields into operation, the infantry set up perimeter patrols and began pushing back the Jap stragglers. But the enemy, no matter where he was in the area, was finished.

The land in those parts of New Guinea is too poor to offer a living. Early settlers could not make a go of it and certainly fleeing troops cannot. The Jap is assigned to starvation, and we do not have to waste our strength or lose men by frontal attacks. This was proven at Saidor when the enemy tried to march around our soldiers, following our capture of that area. Our patrols found thousands dead along the trails in the foothills. Those that did get through to rejoin their own men were ravaged by disease. They were finished as soldiers. And from Saidor to Bogadjim is a short distance.

Hollandia, the Japs' most important trans-shipping point for men, planes and material, was in Allied hands. The 5th Air Force did not pause. During the short time it took to repair the fields and move up the operational units, they continued to hit the enemy at every possible point.

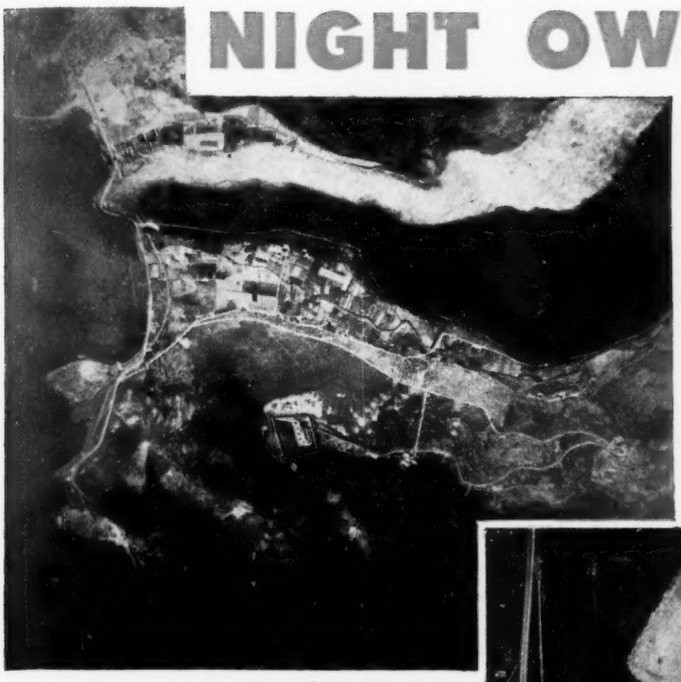
The gap between Saidor and Hollandia was pounded until there was nothing left at the former juicy targets of Wewak, Madang, Hansa Bay and other points. The barge traffic dropped off to zero. The heavy bombers moved ahead and for the first time, on April 28, hit Sorido strip, the important airdrome at Biak Island in the Shouten Island group at the northern end of New Guinea. Phase one of the air blockade was carried out. At least twelve enemy planes were destroyed on the ground and many others damaged while three enemy fighters were shot down and three more probably destroyed out of about forty intercepting.

THE campaign for Dutch New Guinea was started just as the long campaign for British New Guinea was ending. This campaign had cost the Japs over 200,000 of their finest men—veterans of China, Malay and the East Indies campaigns.

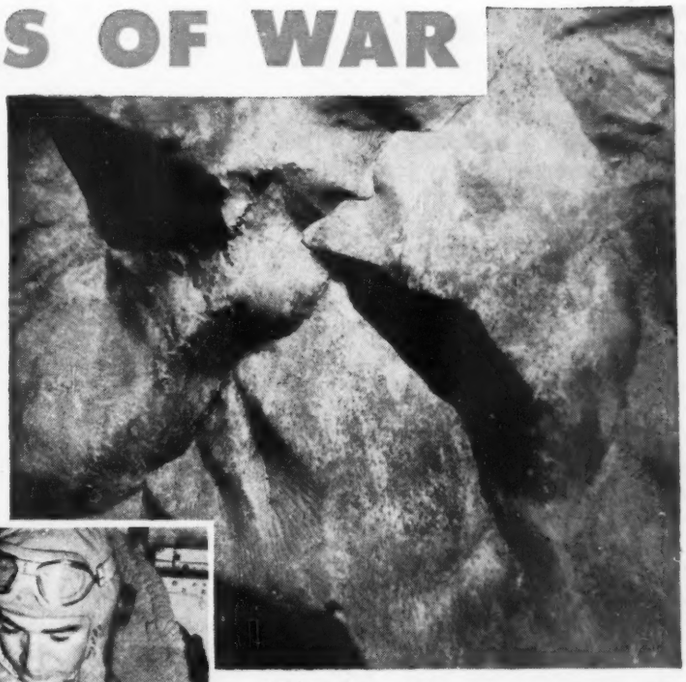
There were approximately 140,000 enemy troops trapped beneath the almost straight line we now hold, which stretches from Hollandia to the Admiralty Islands to Mussau Islands and across to Green Islands and the Solomons. There are approximately 50,000 Japs in New Britain, 10,000 in New Ireland, 20,000 in Bougainville and 60,000 in New Guinea. The enemy has lost from 150 to 175 percent of the planes he had at the outbreak of war. He started with about 4,000 first-line planes,—which means he has lost between 6,500 and 7,000 aircraft. About twenty percent of his merchant marine is gone and so many of his smaller naval craft have been sunk that it will be difficult for him to assemble a well-balanced naval task force.

As this is written, the enemy still has Wakde, Biak, Nabire, Manokwari, Moenri, Babo, Timoeka, Utarom, Fakfak, Sorong and Waigeo and Halmahera islands, as well as other bases between us and the Philippine Islands. The principles of air blockade, "D to the 5th Power," will be used many times before we reach our objective. We know it works. The enemy knows it works. But we hold the trump card—surprise. ☆

NIGHT OWLS OF WAR



Troops and trucks move in the dark; installations are made between nightfall and dawn, and the Owl's job is to get clear pictures of the enemy's doings.



Night photography was not easily perfected, and often great shadows blocked out the very scenes the Owl was hunting on its night reconnaissance missions.

A crew member on the Owl inspects a camera used in after-dark photography.

By Maj. Arthur Gordon

AIR FORCE Overseas Staff

NOT far behind the lines in Italy is an airdrome where a rather depressed looking B-25 sits all day at its dispersal point and glowers at the mountains. A student of feminine psychology, aware that nothing depresses a lady more than out-moded clothes, might assume that the old girl is disgruntled because she still wears the dusty pink war paint that camouflaged her in the Libyan Desert. But such is not the case. She is gloomy merely because it is daytime. This particular B-25 is a night owl. It says so on her faded nose.

The Night Owl belongs to a large and varied family known as the Mediterranean Allied Photo-Reconnaissance Command. For several months now, she has been flying over enemy territory experimenting with night photography. What she has learned and what she has accomplished may be of the greatest significance in future states of the European war.

It is no longer any secret that daylight photo-reconnaissance furnishes the great majority—some experts claim ninety percent — of modern military intelligence. Armies do not move without it. Without it air forces could not assess bomb damage or select camouflaged targets to bomb. Yet up to now, generally speaking, the enemy has enjoyed virtual immunity from this aerial spying for twelve hours out of every twenty-four. During daylight he keeps his trains hidden in tunnels, his trucks concealed in woods. In darkness he moves materiel, repairs bridges, changes artillery dispositions, masses reinforcements — in short does everything which he wishes to conceal from his adversary.

The main reason why more progress hasn't been made in night photo-reconnaissance is simply that all the time, energy and equipment available have been used to keep up with the enormously expanding demand for day coverage. Some successful nocturnal reconnaissance missions have been reported from the Pacific, the RAF has recently made some good night pictures using American cameras, and during the African campaign some sorties occurred that were noteworthy more for excellent flying than for satisfactory photography. In all of these efforts the equipment used was not new, having been standard for at least two years. But until recently personnel trained in its use simply did not exist. The crews of the Night Owl had to start almost from scratch. They are part of an extraordinary outfit comprising men and planes of at least four nations. On that one Italian airfield you can see Americans in Lightnings, Englishmen in Spitfires, South Africans in Mosquitoes, and Free French flying whatever they can get their hands on. The current CO of MAPRC is Col. Karl Polifka, affectionately known as "Pop." He's one of the best photo-recon pilots in the business, with vast experience in the Pacific and a DSC earned dicing Cassino and other dangerous targets in the MTO. His predecessor was Col. Elliott Roosevelt, now commanding the 8th Photo-Reconnaissance Wing in England. Both men are keenly interested in the possibilities of night photography, both having flown this type of mission themselves. It was largely due to their support and encouragement that the Night Owl's nocturnal activities were started.

This photo-recon unit is developing night aerial photography into a fine art.

The first sustained night effort in the MTO began last November. The spark-plug was and still is Maj. John L. McQuigg, a former advertising man and now assistant operations officer whose happiest moments are spent dangling out of the waist window of a B-25 photographing large sections of enemy-held territory.

From the start, the value, limitations and major problems of night photo-reconnaissance were clearly recognized in Major McQuigg's reports on the subject. In asking to have a B-25 assigned for experimental work, he pointed out that there would be innumerable headaches involved in determining proper fuzing and release of the flash bombs, in deciding shutter

speeds, camera tilt, aircraft speeds and altitudes—not to mention the hazards of enemy action and the problems of navigation and weather. But the Night Owl crews were ready for anything that involved flying. If anybody could make night photography pay dividends they said modestly, they were the boys to do it and have fun in the process.

Into their B-25 on these early missions they loaded a K-19 vertical camera and a dozen or so M-46 flash bombs. Dangerous playthings those magnesium bombs—57 pounds of potential cremation. If one is mishandled or hit by flak and goes off, no burial is necessary. This did not discourage the Night Owl crews. In fact, not content with a bomb bay full of magnesium, they did not rest until they had added wing racks for additional, and even more exposed, bombs. Then off they went over the enemy lines with every intention of bringing back pin-point target coverage.

There were some crack flyers on those early flights, men like Lieut. Col. Frank L. Dunn, famed for low-level "dicing" missions, Maj. George W. Humbrecht, an outstanding pilot who survived two crash landings after being shot up in combat, Maj. Richard H. Burnor, Lieut. Col. Leon W. Grey, Maj. Oscar M. Bloomquist, Lieut. Col. J. F. Setchell and Capt. John R. Hoover. Many of these men had completed sixty combat missions when they started flying night reconnaisance.

WITH flyers as experienced as these, the danger of accidents was reduced to a minimum. Still, results at first were far from satisfactory. Navigation was a major problem. Finding the target without the aid of radar proved no easy task unless there was considerable moonlight or unless it was situated near a main highway, a river or some other conspicuous landmark. The bombs were full of mechanical bugs. On mission after mission, good pictures failed to materialize because the bombs burst too high or too low or did not burst at all. Winter weather in Italy was another handicap; it tended to be clearer by night than by day, but even so a lot of time was wasted stooging around looking for holes in the clouds that blanketed targets. With flak occasionally bursting near the bomb-bay full of magnesium—a splinter came through the top turret one night and wounded the engineer in the head—and with an occasional night fighter buzzing past, the hazards were considerable.

The boys used to compensate for all this now and then by loading the wing-racks of the Night Owl with small fragmentation bombs and indulging in a little low-level road bombing when they had used up all their flash bombs. It was on one of these occasions that Lieut. Homer L. Webber got his nickname "Killer." Lieutenant Webber, who deserved most of the credit for the modifications that made the night work possible, announced after one mission that he had personally dropped a "frag" out of the windows squarely on a Nazi truck. This feat he described with such blood-thirsty enthusiasm that everybody began calling him "Killer," and the name stuck. Pretty soon, however, Pop decided that such goings-on hardly constituted decent behavior for a lady like Night Owl and passed word along to stop risking everybody's neck unnecessarily.

By the time the crews had flown twenty training missions and a few operational ones, experimenting with both British and American cameras and bombs, they were getting consistently good results with either of two methods. One was the "open flash" system. The cone of a K-19 camera, the body of a K-17B and an A-5 magazine were hooked up. The shutter was tied open. Film was exposed by the flash of the bombs, after which the film was rolled and ready for the next exposure. This technique produced good pictures, but was subject to interference from enemy searchlights and anti-aircraft fire.

In the "photo-electric cell" system a K-19 twelve-inch or a K-19A thirteen-inch vertical camera was used. A photo-electric cell was connected to the shutter control. The bomb flash at peak intensity —some 6,000,000 candle power—actuated the shutter and wound the film. This method was becoming standard with the night pioneers as spring brought better weather to the sodden Italian country-side.

M-111 mechanical fuzes were found to be most satisfactory with the B-25 bomb releasing mechanism. Dropped from approximately 12,000 feet, the bombs were timed to burst about thirty seconds later. A plate was attached to the rear section of the bomb to hold it behind the aircraft and keep it from bursting within range of the camera lens. As missions progressed, a tandem camera was set up in the Night Owl with approximately thirty percent sidelap. Bombs were dropped at fifteen-second intervals which, at 12,000 feet with an indicated air speed of 200 mph and ground speed of 245 mph, gave satisfactory running overlap for stereo vision. Once the quality of pictures improved to the point where useful interpretation was possible, requests began coming in from the American Fifth Army on the western side of the peninsula and occasionally from the British Eighth Army on the east for coverage of main roads and rails in the immediate battle area. Those requests are still being made with ever-increasing frequency. And they're being filled.

Early in the spring some specially equipped airplanes arrived from the States, and for a while it looked as if the Night Owl's faded pink nose might be out of joint. Developed by Dr. H. E. Edgerton of M.I.T. who accompanied the aircraft, the equipment—a self-contained electrical flash unit—was designed to eliminate two of the main drawbacks of the flash bomb technique: the hazards involved in carrying any substance as dangerous as magnesium and the limited number of exposures determined, of course, by the number of flash bombs that the plane could carry.

Some of the pilots teased Dr. Edgerton, whom they promptly and inevitably nicknamed "Flash," about the aid his equipment might give to enemy flak gunners. "That light just says to those ack-ack gunners, 'Here I am! Here I am! Here I am!' " Actually, preliminary experiments indicated that the Edgerton equipment might be very valuable for coverage of roads and other targets in areas not too heavily defended. In battle areas, however, where night fighters and flak might be expected, a maneuverable aircraft flying at considerable altitude and capable of taking violent evasive action seemed to be better suited for the job. The Night Owl herself was a bit slow for the work; her successors were likely to be A-20s or the ubiquitous Mosquitoes. It did not take great imagination to visualize the day—or rather the night—when aircraft, equipped with the latest navigational aids, would make the Night Owl seem thoroughly obsolete.

Until that time arrives, however, the Night Owl is carrying on. She never knows what sort of trouble she will encounter next. One night when her navigator, Lieut. William Miskho, brought her back to base with one engine misbehaving badly, an ambulance on the field blundered into the flare path and knocked out one entire string of lights. An animated discussion ensued in the Night Owl as to which side of the remaining lights the runway was really on. Opinion was equally divided, but the pilot that night was Colonel Setchell, who had worked back in the States on night photography in the days when you held the camera with one hand and threw bombs out of the window with the other. He made up his mind and hit the runway with one engine coughing asthmatically and the engineer predicting dolefully that the other wouldn't last long.

THE "Night Owl" and her merry men realize perfectly well that in the not too distant future their work will seem crude and amateurish in comparison with the night coverage that their successors attain. They are aware that no one will remember the names of gunners like Johnston, Phillips, Nelson, Pucci, Personette, Rutledge or Cram. They agree that nobody, in all probability, will pin any medals on the cameramen: Furney or Brophy or De Marco or Phillips—let alone the ground crew that kept the Night Owl flying: Meeks, Arvin, Taylor, Ruehlman and Rell.

But they have the satisfaction of knowing that they were in at what really amounted to the birth of a new and highly important war tactic. And each one of them is convinced that, although night photography may still be in its infancy, it is going to be a very precocious child. ☆

ON THE LINE

A MONTHLY MAINTENANCE ROUNDUP PREPARED IN COLLABORATION WITH THE AIR SERVICE COMMAND AND THE TECHNICAL INSPECTION DIVISION, OFFICE OF THE AIR INSPECTOR

8TH AIR FORCE ORDNANCE MEN MEET EMERGENCIES . . .

A requisition slip doesn't do the job. You can't tighten a bomb base plate, remove a distorted fin lock nut, loosen an Edgewater adapter or depress the oil buffer body tube lock spring and remove the oil buffer body with a sheet of paper. If the necessary tools aren't around when you need them, they're useless. Time lost in obtaining them is time gone forever.

Supplying men in the field with the proper tools the very moment they're needed is, in many cases, most difficult. Often the tools on hand are not sufficient or adequate, and sometimes the job requires tools which aren't even listed.

In any case, you can't call it quits. Instead, you do what 8th Air Force ordnance men have done and are doing every day—you make the needed tool.

Aviation ordnance men of the 8th have been confronted with many jobs when enough of the right tools were not around. Sometimes a slight alteration to an available tool has done the trick. At any rate, these men have been producing some special tools they needed in a hurry, merely by using common sense.

Unavoidable damage to bombs and bomb components, such as loosening of bomb base plates and distorted fin lock nuts, often occurs between the shipment of the bombs overseas and their arrival at an ammunition dump in the field. A chain wrench, similar to one used by steamfitters, was designed in the field for the maintenance of bombs. Aviation ordnance shop men followed the designs and made a wrench with which the plates can be tightened and the fin lock nuts removed. It has a steel handle with shoulder notches cut in the handle head. Part of a discarded motorcycle sprocket chain is riveted to the head. The chain, its size varying according to the size of the bomb, hooks on the head projector and slack is taken up by cam action of the head. Previously a wrench with strap webbing attached to a metal handle had been tried unsatisfactorily. It slipped and depreciated rapidly. The chain wrench doesn't.

The job of taking off the Edgewater adapter from a .50 caliber waist machine gun and a 20 mm cannon had been a consistent headache until ordnance men in the field sent into the 8th Air Force ordnance shop plans for a wrench which would remove the adapter easily without damaging it. The shop men experimented with the plans, and the result was a wrench made from scrap steel which removed and replaced the adapters quickly.

It is a closed-end steel wrench serrated on the inner periphery and pivoted at the top center. Positioning lugs are welded on both sides, ninety degrees from the pivot point. At the bottom center two arms extend from the wrench proper, allowing the wrench to be opened and placed on the serrated portion of the adapter. The arms are then brought together, forming in effect, a lever by means of which the adapter may be loosened.

Often a gunner on a mission found that his gun was jammed or firing erratically. The time it took for the gunner to remove his heated gloves and fumble with a wrench and screwdriver in the subzero cold to repair his gun often meant injury and sometimes his life. Tech. Sgt. Allen H. Buell, 8th Air Force ordnance draftsman from Salt Lake City, answered this situation with an all-purpose combination wrench, which does everything for the gunner during a mission. With it he can adjust the oil buffer, depress the oil buffer body tube lock spring and remove the oil buffer body, remove the gun mount adapters, remove a round jammed in the T slot of bolt or adjust head space, all within a few seconds and without having to expose his hands to the dangerous cold.

The tool was made by cutting off the handle of an 8-inch crescent wrench and brazing a $\frac{1}{4}$ by $\frac{3}{8}$ by $5\frac{5}{8}$-inch steel shaft, tapered to a screwdriver on one end, onto the crescent wrench head. The stationary jaw of the crescent wrench is milled. A combination oil buffer filler screw tool and oil buffer body tube lock spring tool is press fitted into the steel shaft so that, if broken, it can be driven out and a new one inserted.

To supplement supplies of the Fahne-

"Spare Parts," considered just about the fastest P-39 in the Pacific, was built, as its name indicates, entirely from a salvaged fuselage and other spare parts by six members of the 7th Air Force. Shown with the plane are the men who built it, standing (left to right) Lieut. Benjamin C. Warren; Sgts. Harry Stahlke, Emil Zaph and George Wolfe; kneeling, Pvt. Eldridge Norton (left) and Sgt. Leo Sanchex.

When our aircraft return from a mission mechs take over, wasting no time in getting the airplanes ready for the next operation. Here, on a base in the Gilberts, mechanics and crewmen have immediately set to work repairing a damaged tail assembly of a B-25. This Mitchell's tail sustained flak holes that must be patched. The damage was done by Japanese ack-ack in operations over the Marshall Islands.

stock clip which holds the arming wire in the bomb fuze vane and prevents the vane from rotating, Cpl. Angelo Lauri designed a hand-operated machine out of parts of a bicycle, jeep, 2½-ton cargo truck and other scrap metal which turns out about 500 acceptable substitutes an hour from discarded arming wire. Corporal Lauri is a member of an S and M Company in the 8th Air Force base ordnance. — Cpl. Rudy Springer, Ordnance Section, 8th Air Force.

Navigator Does Limited Maintenance on Sextant . . .

Because sextants are "personal issue" items, care and maintenance become the responsibility of the navigator—to a certain extent. Maintenance includes what the navigator can accomplish readily in the field without the use of special tools and test equipment. The navigator must *not* attempt to make internal adjustments on the sextant; many received for overhaul indicate tampering by personnel who lacked tools and skill to accomplish a satisfactory job.

Sextants currently in use should give satisfactory service for the duration of the war plus, provided the navigator is familiar with the workings and does not abuse the instrument. The TO on the particular sextant will inform him why unrestricted maintenance is discouraged, and what can be accomplished with the skill and tools available.

The construction of the sextant is comparatively simple. It consists of nothing more than a worm, sector, optical system and scale or counter with which to read the deflection of a prism or mirror from zero. It is built to read to a precise angle. When this angle is measured, there are only four things which can affect the accuracy: "index or bubble error"; back lash; loose prism, mirror or reflector, and damage to worm or sector.

Damage to the worm or sector can be traced to either an excessive amount of dirt, or carelessness when assembling the instrument. Some sextants have very fine threads on worm and sector, and extreme care must be taken to prevent damage while working with them. If the sector or worm becomes burred, a binding and error will result.

Use care when cleaning the surfaces of the optical system. A well washed linen handkerchief is quite satisfactory; be sure there is no grit in the cloth and wipe the surface gently. Optical surfaces must be protected as much as possible and cleaned only when necessary.

To assist navigators with the check and maintenance of sextants, the collimator, optical instrument test, part No. 41G-9323, stock No. 7800-208200, has been supplied to all airdrome, antisubmarine, bombardment, fighter and troop carrier squadrons, as called for in their OEL. In addition, this collimator may be found in all instrument trailers, depots, many subdepots and other similar activities. Stations which schedule frequent celestial navigation flights should have this collimator installed in a room readily accessible to all navigators.

Mail call is one of the big events overseas. On the line with a heavy bombardment group of the Mediterranean Allied Air Forces in Italy, Cpl. George L. Teague, mail clerk, gives personal service on a burro. He didn't have to ring twice for Sgt. George Boosalis, who is reaching down for what is coming to him.

Testing Oxygen Indicators . . .

Reports show that oxygen flow indicators are not being tested properly prior to installation in airplanes. For type A-3 indicators, check operation of the shutters as pre-installation test. Insert the blunt end of a pencil through the large threaded hole in back of the indicator and, pressing gently against the bellows, note the opening and closing of the shutters. If shutter fails to move, spring is broken or shutter assembly is defective.

The bellows and body assembly should also be checked by connecting the type A-3 indicator to an oxygen supply and raising the pressure to ten psi in the indicator. Shut off the oxygen supply and observe shutters; if shutters begin to close within five minutes there is a leak in the bellows or body.

Test the type A-1 indicator for leakage by connecting to an oxygen supply of 500 psi and submerge indicator in water. Bubbles will locate the source of leakage. The minimum indication of the type A-1 indicator must be ⅛-inch upward deflection of the ball with a flow of one liter per minute, from 500 psi to atmospheric pressure with indicator in a normal position.

Complete information will be found in TO 03-50D-2 and TO 03-50D-4.

Incidentally, types A-1 and A-3 oxygen flow indicators are interchangeable provided the necessary low pressure and high pressure connections are reworked accordingly.

Use the Putt-Putts . . .

Never use the batteries installed in aircraft for starting the engines—or for any other purpose—while the airplane is on the ground. This should be a *must* rule. Reference: TO-01-1-52.

Batteries installed in an airplane are there only to work in conjunction with the generators, and to take care of any emergency "surge" which might place an overload on the generators, the main source of electrical power. Aircraft batteries do not have sufficient juice to stand the drag of airplane electrical equipment except for extremely short periods of time. In some airplanes the operation of the radio for five minutes alone will exhaust the battery. Auxiliary, portable gasoline power plants (putt-putts) not only pro-

WHAT'S WRONG WITH THIS PICTURE?

ON THE LINE climbs inside the fuselage of a B-17 this month to bring you a picture of how not to connect the oxygen bottles above the belly turret. In taking this picture the mechanics were asked, "Do they ***really*** gum up the connections like this?" "Do they!" replied one man who knows, "some airplanes come into the hangar with oxygen bottles rigged in a fashion that would outdo Rube Goldberg's craziest contraption."

The gunner's breath of life will depend on perfect flow and functioning of this low pressure oxygen system (excluding other well known hazards). Some boners shown in the past would not preclude an airplane's flying, but these boners . . . well, figure it out for yourself.

Expert mechanics who know the right answers accommodated by posing these boners for July. They are (left to right) Staff Sgt. Early E. Real, Master Sgt. Clyde Gambill and Staff Sgt. Charles H. Minogue, all attached to Flight Section, 4000th AAF Base Unit (Command), Patterson Field.

Sergeant Gambill counts nine mistakes, listed on Page 64. Can you find any more?

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vide starting power for the engines, but they may be used to charge the batteries while they are installed in the airplane, and they *must be used* whenever it is necessary to perform operational checks of electrical equipment.

Failure to maintain the proper charge on the plane's batteries may result in the subsequent failure or improper operation of electrical equipment and failure of generating systems due to overloads caused by the addition of abnormal battery charging requirements imposed upon the normal electrical loads.

Three standard types of putt-putts are allocated to squadrons to provide external electrical power. It is the responsibility of the organizations to obtain sufficient numbers of these units for their service. For supply officers' convenience the types of AAF putt-putts with ASC stock numbers are listed here:

Type C-7 (ASC stock No. 8200-721000) (TOs 19-45-3, 19-45-19) has a capacity of 1,500 watts at 14.25 volts.

Type C-10 (ASC stock No. 8200-729000) (TOs 19-45-5, 19-45-11) has a capacity of 2,000 watts at 28.5 volts.

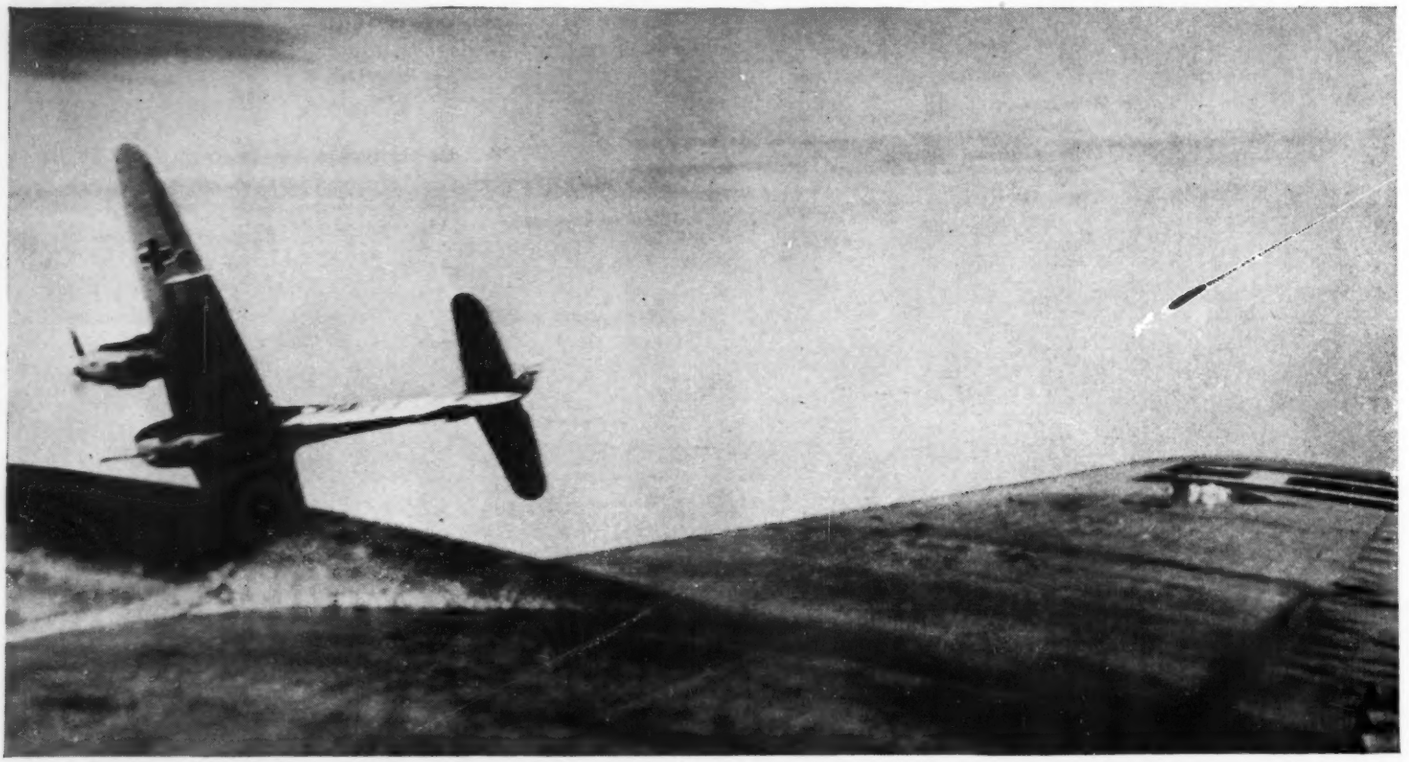
Type C-13 (ASC stock No. 8200-729300) (TO 19-45-7) has a capacity of 5,000 watts at 28.5 volts.

CHOOSE CLAMPS CAREFULLY . . .

Make sure you use the correct type of hose clamps on self-sealing fuel and oil lines; otherwise, should you put on an improper type, the lines might pull off due to broken clamps. Check TO 03-1-29 and Par. 3 *b* TO 04-5-12. ☆

THIS IS YOUR ENEMY

Jap Air-to-Air Bombing ☆ Nazi Jet Planes ☆ Interception Tactics



This Messerschmitt 410 breaks away, banking right, after pressing its attack against an 8th Air Force B-17. The ME came in with its 20 mm cannon blazing and scored at least one hit which can be seen just inside the wing marking of the American plane. The action during a recent raid on Brux, Germany, demonstrates how desperately the Nazis have had to fight in an effort to turn our heavy bombers away from vital enemy areas. The Messerschmitt 410 is not as common in German fighter squadrons as the 110s and 210s of the same manufacture.

GERMAN JET PROPULSION. Before the start of the war most of the major powers in the world had a few plans underway on jet or rocket propulsion for aircraft. The Italians had already flown a rather clumsily designed jet propulsion craft, and Group Captain Frank Whittle of the RAF had completed his plans for his first experimental jet propelled plane. The Germans, always good engineers, have developed by now several jet propelled planes most of them still in experimental stages.

One of the most interesting is a rocket plane, a small bug-like contraption with a wingspread slightly longer than that of a ½ hp model plane, and a deep-bellied, tear drop fuselage just big enough to keep the plane from being a flying wing. It is liquid-rocket fueled, meaning that liquid oxygen and a type of liquid fuel is carried. It is an "alarm" fighter, with a flight duration of from eight to ten minutes. It has no wheels and it takes off from a track. It is supposed to climb rapidly and have very high speed. It lands on belly skids.

JAP INTERCEPTION METHODS. Japanese fighter pilots used many kinds of tactics, some good and some poor, in their attempts to break up Allied bomber attacks in the Gilbert-Marshalls campaigns.

They seemed to have effective aircraft warning and look-out systems, since their fighter planes were usually waiting over the targets when the AAF aircraft arrived. Most of the time, however, the planes did not attempt to strike at our B-24s and B-25s until after bombs were away. They seemed to rely on their anti-aircraft to prevent or spoil our bombing runs.

For a while, Jap fighter pilots would strike from all directions at a B-24 formation, but they gave up that procedure in time and made most of their attacks from ten to two o'clock. Beam attacks were tried occasionally, but runs from the back were rare. The early all-direction tactics were fairly interesting. The Japs seemed to be trying to figure out where they had best advantage. They would come in from any position, break away early and then improvise something else. They took full advantage of the sun, and at first made passes singly, then coordinated single attacks and finally worked in pairs or fours. Frontal attacks from slightly above were quite common and even vertical dives were tried. In the latter, the fighter would dive through the bomber formation from above, allowing AAF gunners a short burst before the fighter was out of their sights.

In attempts to break up formations of B-24s, enemy fighters often would try tricks and feints. Sometimes a few fighters would perform acrobatics to attract attention while other planes attacked from another side. An enemy fighter on the flank of an AAF formation would feint a pass while another fighter would dive from overhead. Enemy fighters would stay off on one flank while another was waiting up sun ready to attack. Three enemy fighters would take a position on a flank while three others went up sun. One fighter would dive out of the sun and, after the pass, would take a position on the flank while a plane from the flank

went up into the sun to take the first fighter's place.

On B-25s, while making most of their attacks from ten to two o'clock, the Japs also tried many beam and rear passes. The mediums in the Central Pacific normally flew practically on the deck as they went into their targets, and the Japs were cagy about diving on them. Vertical dives, of course, could not be attempted.

Now and then, the Japs would fly a mile or so ahead of a formation of Mitchells, slow roll and make shallow dives on the B-25s from about 1,000 feet, turning sufficiently to fire on the whole formation. Jap fighters occasionally would start from about 2,000 yards out, come within 1,000 yards and break off into split S. Frontal attacks usually started from about half a mile ahead and 2,000 feet above. The enemy fighters would come down in a shallow dive, split S and half roll, with a breakaway at two o'clock.

In the latter part of the campaign, the Japs used "pacers" which stood off on one side of AAF formations and signalled to fighters as well as giving directions to AA installations as to altitude, course and speed of our aircraft. In this phase of the battle there was considerable air-to-air bombing by the Japs.

AAF crews were impressed throughout the campaign by the excellent teamwork between Jap fighters and their anti-aircraft.

Luftwaffe and Grasshoppers. Because the Germans normally go after that what bothers them most, enemy fighters in Italy spent some time chasing small observation planes which were gathering information for Allied infantry and artillery. The Germans soon found, however, that hunting down the little airplanes didn't pay off because the cubs usually were able to elude them or lead them back to anti-aircraft protected areas.

This One Worked. The Japs, who have been trying a lot of air-to-air bombing, finally knocked out a P-38 with the tactic a few months ago. A top turret gunner on a B-25 the fighter was escorting reported:

"We were flying at 12,000 feet and from my position as top turret gunner I saw a P-38 about 2,000 feet above us and to the rear. Possibly 6,000 feet above the P-38 I noticed a plane and saw an object drop from his belly tank shackle. This object turned out to be a phosphorus bomb which exploded right in front of the P-38. Many tentacles spread out with the body staying in a mass. The P-38 flew right through the main part and, possibly fifteen seconds later, I noticed white smoke coming from each engine. Not five seconds afterwards, both engines burst into flames which soon seemed to envelop the whole leading edge. The P-38 went into a spin and I watched it go into the water. . . ."

Self-Sealing. A good self-sealing gasoline tank has finally been designed by the Japanese and is now being installed on their airplanes. The sealing cover consists of a number of layers of rubber with a total thickness of one and one-eighth inches. In some tests on a tank found in a crashed Jap flying boat, AAF engineers ripped a hole almost an inch in diameter in a layer of the sealing material and the hole closed up with no seepage whatever, indicating that the sealing qualities of the tanks are excellent.

More on Mines. The Germans continue to attach anti-personnel mines to anything handy, and among their latest booby traps are fence posts. A wire leading to a detonating fuze is attached to the bottom of a post, with the wire extending to a large buried explosive charge.

Another trick was that of an enemy patrol which happened on one of our artillery observation post telephone lines. They cut the line, then buried some mines near by and attached the ends of the telephone line to pull igniters. They figured on a lineman coming along in the dark and picking up what he thought was a loose end of wire. The trick wouldn't work so well in the daytime because what had been done was obvious.

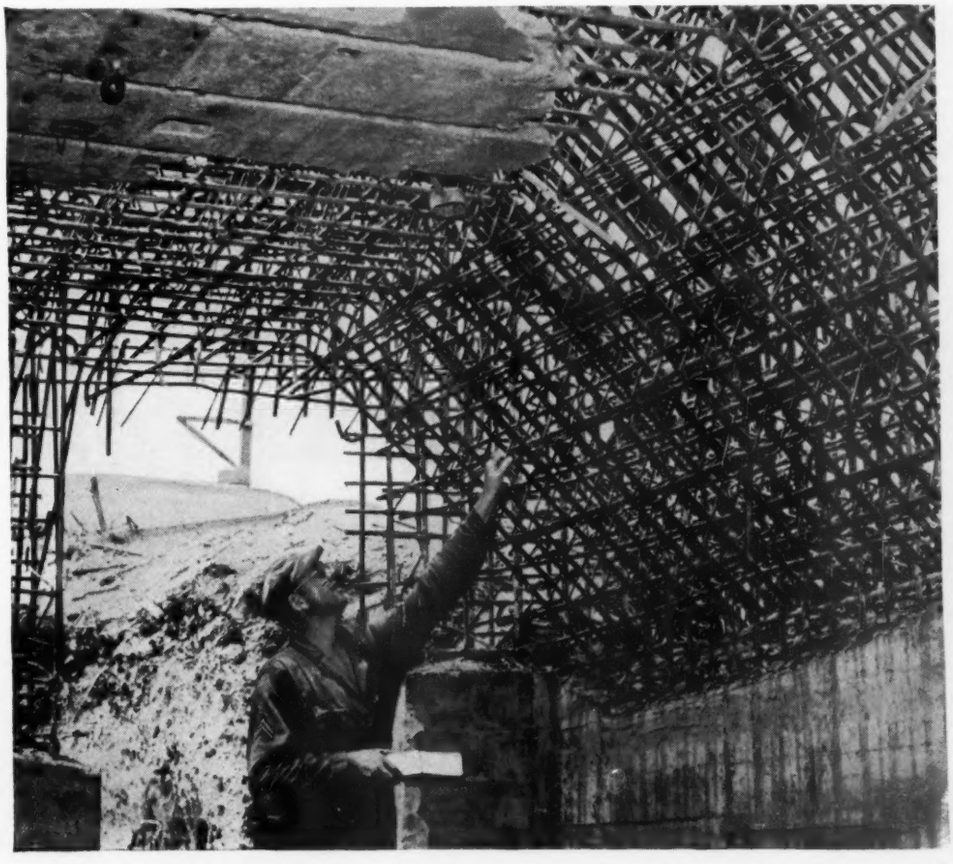
At a ford, usable only in certain seasons of the year, the Nazis equipped the banks with trip wires leading to mines which would have been detonated by anyone attempting to cross at the ford.

Hara-Kiri with Bumps. They tell this story in the South Pacific about one Jap who did not want to go off to the wars.

He was a replacement in the 80th Infantry Regiment, assigned to go to the front. He sat in the second story window of his barracks, took a round from his ammunition pouch, put it into his rifle. He placed the muzzle against his left shoulder, and stepped on the trigger with his right foot.

Even at that distance he missed. The excitement got him, however. He fell backward out of the window, bruising his left buttock, left ankle and face. He also broke his acetabulum, which, in case you are nervous, is a socket in the hipbone into which a thighbone fits. ☆

It takes plenty of solid hits to knock out a Japanese pillbox such as this because of its thick, rugged construction. Cpl. Joe Quinn inspects the exceptional steel reinforcement and 22-inch concrete wall. This one was wrecked by accurate shelling and bombing in recent fighting in the Pacific.



PICTURE CREDITS

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Roll of Honor

A MONTHLY RECORD OF DECORATIONS AWARDED TO PERSONNEL OF THE ARMY AIR FORCES

(Continued from Page 48)

Turley, Joseph J., S/Sgt.
Underwood, Glenn W., Lt. (& OLC)
Valcik, Stanley, Lt.
Van Buren, Martin R., S/Sgt.
Vengelen, Ray F., Lt. (& OLC)
Vick, Lowell C., T/Sgt.
Vincent, Larry W., S/Sgt.
Vogel, Robert I., S/Sgt.
Walaczaka, Raymond C., S/Sgt.
Wallace, Charles N., Lt.
Waltman, James R., S/Sgt.
Ward, John V., Lt.
Ward, Lester T., S/Sgt.
Ware, Warren H., Lt.
Wargo, Stephen, S/Sgt.
Warner, Delbert R., S/Sgt.
Washburn, Curtiss, S/Sgt.
Watkins, Chaplin J., Lt.
Watkins, John C. A., Capt.
Watt, David S., Lt. (& OLC)
Way, Boyd S., S/Sgt. (& OLC)
Weant, Willie B., Lt.
Weden, Edward J. Jr., S/Sgt.
Weir, Edward E., Lt.
Welch, Earl C., T/Sgt.
Wells, George W., T/Sgt.
Wells, Roy L., Sgt.
Welton, John V., S/Sgt.
Werts, Stanley R., Lt.
Wessel, Ralph C., S/Sgt.
Whitaker, Coleman S., Lt.
White, Charles F., S/Sgt.
Whitlock, Charles A., Lt.
Wickham, Clyde G., T/Sgt.
Wildermuth, William, Jr., S/Sgt.
Wilkinson, Charles W., S/Sgt.
Willhight, Wilbur W., S/Sgt.
Wilson, George H., Lt.
Winger, George W., Lt.
Witter, Ray F., S/Sgt.
Wolf, Raymond A., T/Sgt.
Wolfe, Robert W., S/Sgt.
Womack, Hubert J., S/Sgt.
Womble, Hubert H., Lt.
Wood, Jack K., Lt.
Wood, Thomas M., Sgt.
Woofter, Robert D., T/Sgt.
Wright, Frank C., Lt.
Wright, Robert L., Lt.
Wright, William E., Lt.
Wyatt, James L., Lt.
Wyatt, Kirk K., Sgt.
Yates, Lawrence A., Jr., S/Sgt.
Yates, Will A., Lt.
Yerington, Edward R., Lt.
Yocum, Donald C., T/Sgt.
Yost, Harold N., S/Sgt.
Youmans, Charles F., Lt.
Young, Charles S., F/O
Young, Frank, S/Sgt.
Young, James D., Lt.
Young, Joseph J., Lt.
Young, Robert E., Lt.
Yuschak, Edward, S/Sgt.
Zablocki, Walter A., T/Sgt. (& OLC)
Zaruba, Leroy E., Lt.
Zeger, Wilbur M., S/Sgt.
Zendegusi, Luis T., Capt.
Zenz, George R., Sgt.
Zettlemoyer, Earl N., S/Sgt.
Zielaskowski, Alfred M., T/Sgt.
Zimmerman, Earl, T/Sgt.
Zimmerman, William R., Lt.
Zink, Grover A., Lt. (& OLC)
Zubko, Boris M., Capt.
Zwicker, Henry R., Lt.

Answers to Quiz on Page 38

1. (a) 1,100 miles
2. (c) Forward. To assist the pilot and co-pilot in leaving the plane
3. (a) The mixture in the carburetor is too rich
4. (c) The Canal Zone
5. (c) Single-engine, single-place, low-wing monoplane with inverted gull wings
6. (c) In the Mediterranean
7. (b) Two seats, one behind the other
8. (d) Florida
9. (b) A navigational computer
10. (a) Twin-engine medium bomber
11. (c) Off the Chinese mainland
12. (c) 400
13. (b) The Netherlands
14. (a) To call for help
15. (a) True
16. (b) False
17. (a) 35 gallons
18. (d) A meteorological term referring to a downward motion of air
19. (a) Single-engine fighter
20. Left to right: P-39, P-40, P-51

Mistakes in 'On the Line' Picture on Page 61

1. The sergeant sitting on the left is holding the oxygen recharging hose in what appears to be a dirty, *greasy* hand. Grease will contaminate the fittings, may come in contact with oxygen and cause an explosion. One of the high points of this month's picture is the dire hazard of grease coming in contact with oxygen, potential cause for demolition of the entire airplane. See TOs 03-50-1, 03-50A-1 and 02-20EF-2.

2. Now, getting around to those oxygen cylinders, the one on the right is upside down. In order to attach tubing from the cylinder to the correct connections, much tubing and time have been wasted. By connecting the right way—with the check valve at the bottom of the bottle—the least amount of tubing is used which, with the fewest possible connections, reduces chances of leaks.

3. Because the check valve is hooked up backwards, the fittings are crossed. On both bottles the distributor is running into the filler valve. The sure way to hook up properly is to refer to the arrows on the valve to show which way the oxygen will flow. If the hook-up is backwards the oxygen will leak.

4. The flexible hose on the distributor line running from the pressure gauge into the turret is too loose. When the turret turns, the line will be chafed and possibly wear through and burst. Clamp the line securely to prevent rubbing.

5. There is a kink in the line running from the filler fitting to the check valve on the right bottle, caused by not forming the line properly. The kink will restrict the oxygen flow and promote danger of the line's bursting from pressure.

6. A nick at no time does an oxygen cylinder any good! Ground personnel, prone to mishandle cylinders, drop them carelessly and subject them to various forms of nicks and dents. These dents weaken the metal and vibrations of the airplane crystallize the dented places. Further vibrations may result in open cracks. That's why handbook AN 03-50C-3 was prepared—to explain proper handling of oxygen cylinders. Have you read it?

7. Nix on that dirty, greasy rag parked on the turret. Repeat: TOs 03-50-1, 03-50A-1 and 01-20EF-2.

8. We've seen everything now, with the sergeant tightening a distributor connection with a ten-inch crescent wrench. Use the proper ⅝-inch open end wrench, please. Too many inch pounds easily strip threads or break off the flare on the tubing.

9. Is it? Yes, it *is* a can of ordinary thread lube the sergeant on the right is holding. See TO 03-50C-3. If he uses this on fittings, grease will get into the system, cause immediate explosion. Use standard thread compound, Spec. AN-C-86, recommended in TO 03-50-28.

MEET BURMA

(Continued from Page 42)

A rainfall of over eighty inches, on the right soil, will cause the growth of the tall jungle trees, with crowns forming a dense canopy overhead. Ground vegetation may be almost absent, or there may be a carpet of ferns or a tangle of cane, creeping bamboo and palms.

Probably the commonest vegetation in Burma is a combination of oak growth and grassland. It occurs in the hills from about 3,000 to 5,000 feet, where frosts occur. The oak forests retain their leaves the year round. Mixed in with the oak, and sometimes in extensive areas of light sandy soil, are pine forests.

On the east side of the Arakan Yoma moist teak forests form a zone between the oaks and the dry deciduous forest of the central Burma basin. Another valuable kind of timber is the pyinkado, which grows farther south than the teak.

There are a number of special precautions that may be useful for men operating in the Burma area. These are in addition, of course, to the usual warnings about avoiding mosquitoes, treating scratches quickly, purifying water and refraining from eating uncooked local foods:

Consult the headman in a village for permission to make camp nearby, attend festivals or make purchases.

Respect the Buddhist monks. Drop a coin in their "begging bowls."

Learn the Hindu caste marks. They are "insignia."

Don't pay the first price asked by a Mohammedan or an Indian. It is part of his fun to haggle. But a Burman won't bargain.

Be generous with cigarettes and tobacco. All Burmans smoke, including the children.

Try to learn the differences among the various peoples. They don't like to be confused.

Don't gamble with the Burmans. They take gambling seriously — and lose hard.

Don't touch the food of Hindus or allow your shadow to fall across it. Only special castes may prepare food.

Don't offer milk to Nagas and other hill tribes. They regard it as impure.

Don't show the soles of the feet to Mohammedans or touch them with the left hand. Don't eat with the left hand before Mohammedans.

Don't touch anything in pagodas, temples or shrines.

Don't mutilate trees. Many of the local people are animists and consider trees the dwelling place of spirits.

Respect the various religious and social beliefs. Remember, as a foreigner you have no standing.

Stay out of political arguments of local peoples. ☆

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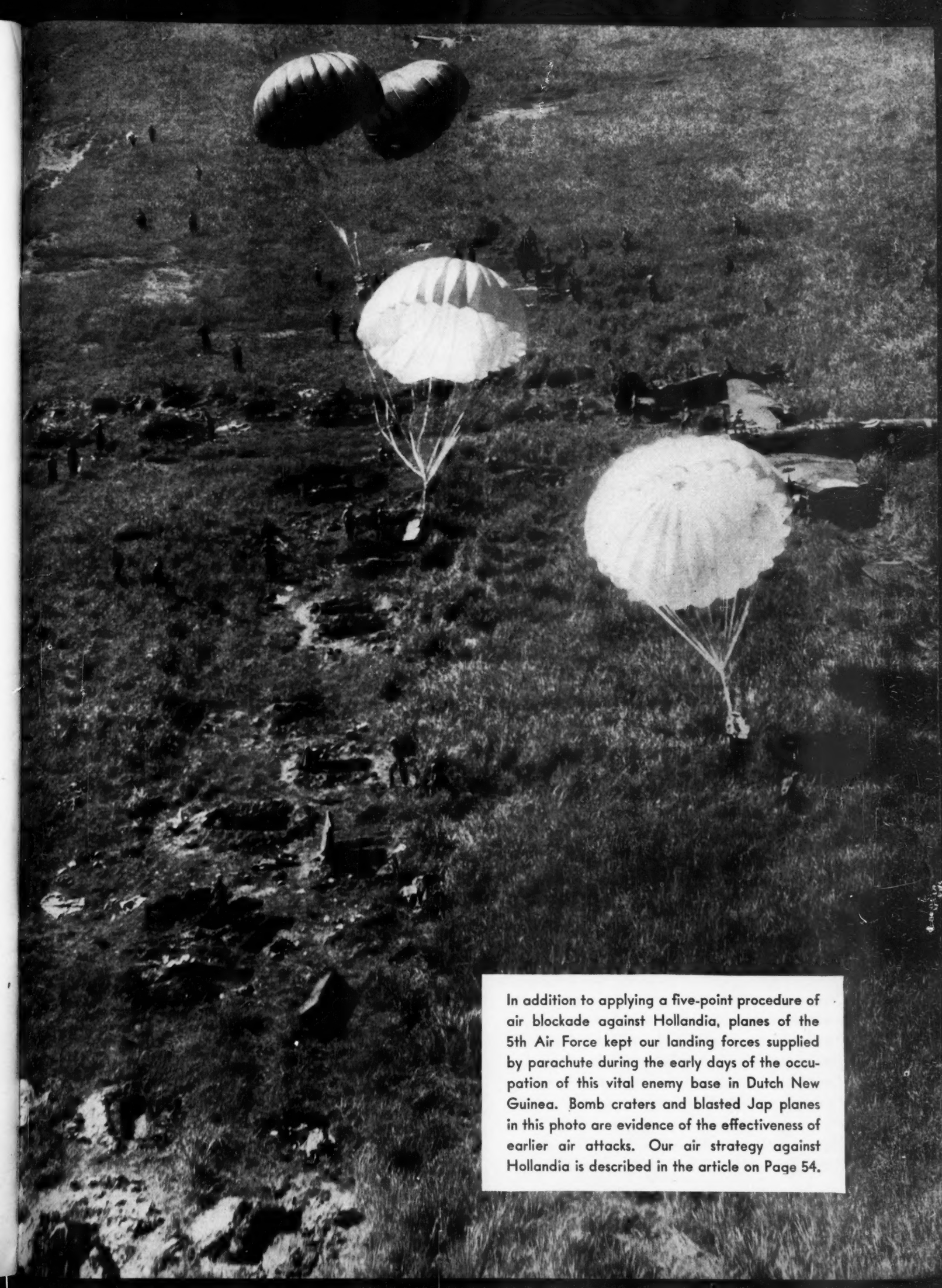

In addition to applying a five-point procedure of air blockade against Hollandia, planes of the 5th Air Force kept our landing forces supplied by parachute during the early days of the occupation of this vital enemy base in Dutch New Guinea. Bomb craters and blasted Jap planes in this photo are evidence of the effectiveness of earlier air attacks. Our air strategy against Hollandia is described in the article on Page 54.

team track. *Railroad.* A track on which freight cars are placed for loading or unloading by shippers and consignees. *Colloq., U.S.*

team'work' (tēm'wûrk'), *n.* 1. Work done with a team, as distinguished from that done by personal labor. 2. Work done by a number of associates, usually each doing a clearly defined portion, but all subordinating personal prominence to the efficiency of the whole; as, the *teamwork* of a football eleven;

or the teamwork of the AAF!

tear'al (tēr'l), *n.* [AS. *tāeren*, *el.*] A kind of large basket. *Obs. exc. Dial. Eng.*

tear gas (te... that, when... mosphere, b... tears and... war, in dis... — called... *gas* or *lac*... gases of t... liquids, a... benzyl br... in shell... ades (te... **tear gre...**

tear'ing ... tears; ... hasty; ... mende... rage; ... sive; ... ously ... *loq.*

tea ... On...

THIS IS NOT A ONE-MAN WAR—
YOUR TEAMMATES DEPEND ON YOU!